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## **CONTENTS**

### **Symposium on Examinations**

|  |     |
|--|-----|
| Examination or Examiner. <i>E. A. MacEwen</i> .....  | 65  |
| The Minnesota Comprehensive Examination Plan.<br><i>Harold S. Diehl</i> .....  | 71  |
| The Plan of Promotions in the First Two Years at the<br>University of Oregon Medical School. <i>H. J. Sears</i> .....  | 79  |
| A Superior Written Examination (Objective Type) as<br>Applied in the Medical School. <i>Robert P. Dobbie</i> .....   | 85  |
| Study of Accomplishment of the 1936 Freshman Class in<br>Seventy-eight Medical Colleges in the United States and<br>Eight Medical Colleges in the Dominion of Canada.<br><i>Fred C. Zapffe</i> ..... | 130 |
| The Meditations of a Tadpole .....   | 142 |
| Editorials .....   | 143 |
| College News .....   | 147 |
| General News .....   | 152 |
| Abstracts .....  | 156 |
| Book News .....  | 158 |

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JOURNAL  
OF THE  
Association of American Medical Colleges

Volume 13

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## Symposium on Examinations

### Examination or Examiner\*

E. M. MACEWEN

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For the past thirty years, educational experts have devoted much of their research to the subject of this symposium. An extensive literature has appeared either presenting the findings of these studies or attacking them. Too much of the research has been devoted to the proof of the unreliability of a certain type of test, and not enough to the persons using the test, and the way they use it. It is not the purpose of this paper to add to this controversy. It is well for us to remember, however, that no matter what methods are used, the cream will float to the top and the debris settle to the bottom. If promotion is the only purpose of an examination, it matters little whether you use an oral or a written one, certain students will be at the top of the class and others at the bottom. It has been shown by many leading experts, and correctly so, that the separation of the sheep from the goats should be, not only a minor factor of examinations, but of all educational procedures. In fact, many leading educators have advocated that as a measure for granting awards, or promotion, written examinations should be abolished.

Little fault was found with examinations until the traditional educational system failed to meet the demands of changed political and social conditions. This traditional system was built on the theory that all men were born equal, that education was largely for cultural purposes, and that it could be achieved only by following a routine path. It demanded that the pupils must adjust themselves to a rigid curriculum. In early days, paternal foreordination limited the demands on higher education. The small number of students made individual instruction possible; the teacher had time to learn to know his pupil as well as to teach him. Under such conditions, it mattered little what the type of examination was, the right students were promoted. The compulsory educational movement of the 19th century changed this relationship. The increased enrolments made individual instruction less possible, and the teacher's evaluation less reliable. About 1845, final written examinations were introduced for promotional purposes. Since they either awarded merit, or punished lack of achieve-

\*Read at the Forty-eighth Annual Meeting of the Association of American Medical Colleges, held in San Francisco, October 25-27, 1937.

ment, from their origin they carried a punitive stigma. This fear complex is one of the bad factors about examinations. Why should students who come to a daily quiz with but a slight acceleration of the pulse, become almost panic stricken at the word "examination"? Chiefly, because we, as teachers, have put a wrong emphasis on this very useful instructional adjunct. The introduction of the written examinations about the middle of the 19th century was hailed by leading educators with much the same promise now being bestowed on our new types of tests. Horace Mann, arguing in their favor, stressed their fairness, the elimination of chance questions, and the elimination of certain unsatisfactory subjective factors. All in all, they gave promise of a solution for an educational morbidity. Following the Civil War, paternal election, or the apprenticeship system, began to give way to the right of individual selection. This right of choice of a vocation stimulated competition and individual initiative.

To meet this competition, each year more and more demands were made on secondary and higher education. Each year an alarmingly large number of these fell by the wayside. It soon became evident that many of these failures were not because the student lacked ability, but that he lacked the ability to adjust himself to the fixed curriculum of the schools. The public demanded an educational system to meet the needs and the abilities of the students—an educational system in which the curriculum could be adjusted to the needs of the student, not the student to the curriculum. It, therefore, became the purpose of education to discover the ability and the aptitude of a student, and then to guide him to the education best adapted to his capacities. Or, in the words of Balfour, the right education for the right individual.

As early as 1886, the reliability of the final written examination, as a measurement of achievement, was being challenged. It was claimed that these examinations were too indefinite; that they encouraged cramming; that they led to dishonesty and that no two teachers would mark the same paper alike. Outside of certain public schools, little attention was paid to these criticisms until in 1905 Cattell challenged the reliability of examinations of the College Entrance Examination Board. A year later, Thorndyke, checking the results of three classes at Columbia, admitted through this board, found "prediction of college ability based on the traditional written examination, an extremely imperfect means of estimating an individual's fitness for college." The doubts cast on the validity of these entrance examinations caused others to challenge the reliability of marking in all written examinations. Thus, by the end of the World War, what was only an opinion in 1886 was proved by a scientific approach.

The attack centered on the written examination was not because of its failure when properly used, but was due to the attempt to make one type of test a measurement of all values. To prove the need of other types of test, the unreliability of marking furnished the most vulnerable point for the attack on the traditional tests.

During the past quarter of a century, educational research has centered on the development and perfection of these new types. Out of this has come the

intelligence test, the aptitude test, and various progress tests. Like most medical educators, I make no claims to being an authority on educational methods. On the other hand, I know of no group of teachers in a better position to evaluate educational results than the faculties of our colleges of medicine. All of our students have had at least two years of higher education, and more than 90 per cent of them have spent three or more years in search of credits. They should be the product of an educational system that is the resultant, to quote Kandel, "of two decades of research devoted to the perfection of all available measures of ability and attainment, and to the discovery of the kind of information that is most needed about an individual in order to supplement existing measures to yield the best diagnostic and prognostic results." In other words, they are the product of an educational system tuned to discover the ability of the student and to provide the education best suited to that student.

Each year approximately 45 per cent of one of these especially directed and prepared groups is selected by our colleges of medicine. About 30 per cent of this group will not graduate with the class. This 30 per cent may become our most serious problem in the near future. You will note the word "failure" was not used in referring to this group. It is time that educators realized that the word failure can seldom be applied correctly to students at the professional level. They are the product of misdirection, improper selection, poor instruction or a combination of these. When our schools below the professional level attain the ideal of Balfour "the right education for the right pupil under the right teacher" there should be a very small mortality at the professional level, and this should be from causes other than scholastic. On the other hand, granting that Burk is correct when he states that "there are no misfit children," there are misfit environments, and many students are directed into misfit occupations. It becomes our obligation to the public and to the ideals of our profession to block as many of these as possible at the admission level. If admitted, it becomes the duty of our faculties to see that at the earliest possible moment these misdirected students are redirected and guided toward their natural aptitudes.

In recent years, there has been an unprecedented demand on the part of our youth for a medical education. Authorities warn us that a similar demand for professional training was an important factor in the political and social upheaval in Germany and in Italy. If this is true, it adds much to the already grave responsibility of proper selection. Regrettable as this tendency to overcrowd our profession may be, there should be little sympathy for the dog in the manger attitude of many leaders in our profession. It is not, and never should be the function of any college of medicine to prevent properly qualified individuals from entering the profession. No one has the right to prevent a properly qualified individual from entering his chosen vocation. If we, as a profession, through false standards or other unjust barriers attempt the limitation of new additions to our membership, our entire organization will fall into disrepute. New institutions will be developed and new agencies will assume control. We will never be challenged seriously as long as our efforts are directed toward a medical education for only those having the right aptitude and attitude.

There are three levels at which it is possible to check the qualification of an individual for the practice of medicine; before admission, in course, and after graduation. The first two should be all that is needed if our colleges accept their full responsibility.

We must not permit this unprecedented demand to overtax our limited facilities. It is our primary duty to provide an adequate preparation for the general practice of medicine for each student accepted. These limited facilities demand class limitation and class selection. That something is wrong with our selective mechanism is adequately proved by the high annual mortality in our classes. But this is only part of the problem. The blocking of these misfits, if they really are misfits, cannot be questioned. The real problem is how many really qualified individuals did we reject when we accepted this 30 per cent of misfits?

At present, we have five approaches to the selection of our students. College grades, entrance examinations, evaluation of ability and aptitude by college instructors, medical aptitude test, and the judgment of an admission committee. An attempt has been made to enumerate these in order of decreasing reliability. Sollmann, in his paper before the annual congress on medical education held in February, 1937, clearly indicated why premedical grades are unreliable. He also indicated what should be expected from the aptitude tests. The Minnesota studies have shown what *can* be expected. Subjective factors too numerous to mention affect these last two statements. The fact that any or all of these have failed in so large a percentage of admissions, does not mean that they should be rejected. The medical aptitude test is not only a valuable adjunct in advising students and parents before admission, but it becomes an extremely valuable aid in advising members of the 30 per cent group referred to above. It is to be hoped that our experts will be encouraged to continue their researches for more reliable predictive tests.

Since no accurate measures are available whereby we can predict prior to admission the probabilities of an individual's success in medicine, the second, or in course level, becomes the most significant. It is here that we must keep faith with our students, with the public, and with the profession. At this level, we must utilize every available method of evaluating ability and aptitude. Not only must we have in mind our obligation to society—an adequately educated doctor—but, equally important, we must be certain that each one of those dropped had ample opportunity to determine his ability. It is at this level that the subject of this symposium assumes its importance. To revert to the early custom of evaluating a student's ability on a single examination of any type is most unfair and unjust. No single test can ever be considered an accurate measurement of ability or of achievement. If we are to measure adequately the ability of a student we must see that he receives proper instruction. No one should be entrusted with the education of any student who does not consider the teaching of that student his primary function. It is high time that we gave more attention to the examiner and less to the type of examination. To furnish a student with

materials and directions as to the location of the library, with the knowledge that six months or a year hence a set of questions will be given him, which a secretary will evaluate, is not teaching. To so organize our courses that we may spend the maximum time in private practice, while the interns direct the student in the hospital is shirking responsibility. In the selection of our teachers, emphasis should be laid on teaching ability rather than on the number of publications. Do not misunderstand me. I am not decrying research, but simply emphasizing what is already well accepted, that research ability is not an index of teaching ability. If we give more attention to the selection of our teachers, methods of instruction will require less emphasis. The good teacher will utilize every acceptable method for instruction and not the least of these will be frequent written examinations. One of the weak spots in our system at present is a tendency for the professor to give the lecture, and then depend on the assistants to conduct the laboratory or ward work. If the professor's time is so limited he would do well to reverse the process. Lectures at best give only a limited amount of information. Knowledge is gained in the laboratory or at the bedside. Here the instructor has an opportunity to know his student; to talk informally about problems, free from the tension of an examination. It is claimed by some that it is impossible for the instructor to know well any large number of students. Little is impossible where there is a will to do. Staff judgments should always be sought before a student is failed. Frequent periodic tests, both written and oral, are necessary not only to check the student's progress, but also that the instructor may determine how well he is succeeding in teaching the students the objectives of his course. In order to stimulate review and retention, it is well so to state questions that cumulative information is required. But in all cases the questions must be clear and to the point.

The periodic tests, oral and written course examinations, and a written comprehensive examination at the end of the year should give a satisfactory evaluation of the student's ability. The comprehensive examination has certain definite values in stimulating review. We all learn by repetition; anything that causes the student to review his work has merit. It is doubtful if it plays a significant factor in compelling the student to review from day to day. In a sense, the state licensing board examination, the examinations of the National Board and the competitive examination for internship are comprehensive. We are all familiar with the cramming in preparation for these. Some advocate that comprehensive examinations covering the preclinical subjects should be given by the members of the clinical staff. There is merit in this opinion, but it might be well, first, to compel the staff to write the examination, and have their papers corrected by a disinterested group.

There is no question of the value of properly organized comprehensive examinations in the field of medicine. The physician must be trained during his student days to organize his learning properly, and to be able to apply it quickly and accurately in emergencies. Furthermore, the comprehensive examination will stimulate the departments to a better correlation of their courses.



The question of the type of examination has long been a point of controversy. In approaching this question it is well to quote from Sollmann's paper: "It should not be expected that the testing of men by men will ever be perfect, for even if the test were perfect, those who take it are not." Moreover, as yet no single type of examination can be relied on as the sole device for the evaluation of the student. If at the beginning of each course, the instructor would outline clearly the objectives of his course, and so direct his teaching and tests that these objectives are attained, the type of examination would be of little concern. There is no question that the new types or so-called objective tests have certain merits over the traditional examinations. That they are graded more accurately, that they are a better measurement of quantitative information, more specifically measure the factors asked and rule out subjective factors, cannot be denied. Their construction requires much time and great care. To quote Kandel, "The simplicity of the finished product is likely to be delusive since more is involved in the preparation of test items than inverting or disguising questions. The amateur is likely to plunge into the preparation of tests without realizing the editorial and statistical difficulties involved in constructing and scaling them, in interpreting scores, or converting scores into grades."

There is little doubt that below the professional level, where the primary object of examinations is to discover the ability of the students and then provide for them the kind of education best suited to their abilities, the objective type of examination has certain advantages over the essay type.

The objective of a medical education must be to assure the public that the student is adequately prepared to give service. That he has acquired not only an adequate training, but has been trained quickly and accurately to apply this knowledge under emergencies. When confronted with a problem, he will not have before him a list of words to select, or sentences to complete, but must elicit by his questions certain facts, and in an orderly manner analyze and arrange this information for the proper treatment of his patient. It is in this type of education that the essay examination surpasses the new type. Moreover, the essay type of examination can be made objective if ample time is given to its preparation.

Since no single type of examination can be perfect, and since the students should always have the benefit of the doubt, a proper use of both types is the fairest method. For, in the final analysis, examinations are inanimate things. They cannot be more perfect than the individuals who make them.



## The Minnesota Comprehensive Examination Plan\*

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One thing which the faculty of every medical school would like to know is which of its many applicants for admission and which of the students in its classes have the inherent abilities and personal qualifications necessary to become competent, conscientious physicians. In order to have some basis for judgment on these points, we carefully investigate the qualifications of applicants and subject our students periodically to various tests and examinations. Such procedures are valuable aids in the selective process which we must carry on, but everyone, except possibly the most naïve, realizes fully that every type of examination yet devised has definite limitations and serious shortcomings.

To students and to administrative officers examinations are of vital importance. Their results are the basis of administrative action and become a determining factor in the life careers of many students. Some students fail to pass their examinations and are denied the opportunity to continue their medical education; others pass with average records and probably become average physicians; still others do brilliantly and are rewarded with opportunities to continue their medical and scientific education on a graduate level.

Yet, in spite of such acknowledged importance of examinations, most medical faculties consider them merely a necessary evil, to be disposed of as quickly and as expeditiously as possible. In view of this, it is well worth while for this Association periodically to call the attention of its members to the significance of examinations and to new examination procedures which seem to offer some improvement over traditional methods.

Probably the reason the program committee invited me to participate in this symposium is to present a progress report on the comprehensive examination system which has been in use by the Medical School of the University of Minnesota for the past ten years. Five years ago, my distinguished predecessor, the late Dean E. P. Lyon, participated in a similar symposium on the program of this Association and presented the Minnesota plan of conducting examinations. Since that time, certain minor modifications in rules and procedures have been made but the examination system in use today is essentially that which he discussed.

Briefly stated, our system of so-called comprehensive examinations consists of annual departmental examinations, correlated with the examinations of other departments by means of an examining committee and given under the supervision of one chief examiner. Our efficient chief examiner, Dr. A. T. Rasmussen, professor of anatomy, takes complete charge of arranging for and of conducting

\*Read at the Forty-eighth Annual Meeting of the Association of American Medical Colleges, held in San Francisco, October 25-27, 1937.

these examinations. All examinations are held in the "Field House;" freshmen, sophomores and juniors taking their examinations at the same time, with seating arranged so that each student is separated from his nearest classmates by students from each of the other two classes. Proctors are provided by the several departments in accordance with the request of the chief examiner. The examination papers contain no names, but, instead, the numbers which have been assigned to the students by the chief examiner for purposes of the examination. Under this system we never hear of any suggestion of dishonesty or attempted dishonesty on the part of students.

Comprehensive examinations are offered in June and in September. Classes run continuously throughout the year without the usual interruption of examination periods at the end of each term. Quizzes in the various courses are conducted from time to time by the individual departments; on the basis of these quizzes and the quality of the student's laboratory work, the department certifies that a student is or is not eligible to take the comprehensive examination.

Three weeks before the end of the school year, classes are discontinued. This allows approximately ten days for students to study uninterruptedly and ten days for the conduct of the examinations. Examinations are scheduled only in the morning, and in the freshman and sophomore years a free day is allowed between each examination. In the junior year, because of the larger number of examinations, it is necessary to schedule some of the examinations on consecutive days. The time allotted to each department for examination purposes is roughly proportionate to the instructional time which is assigned to that department during the year.

A preliminary draft of each departmental examination is prepared by the department and is submitted to the chief examiner. The examinations used are in part objective and in part subjective. When these have been received from all departments, the chief examiner calls together the examination committee for each class, which consists of a representative from each department offering course work to students in that year. This committee reviews and passes on questions which have been submitted by the individual departments, eliminating those which seem too difficult, unimportant, or ambiguous. The functioning of these committees has definitely improved the quality and the comprehensiveness of the examinations.

The examination papers are graded by representatives of the individual departments without the identity of the students being known. All papers which are graded "D" or lower must be reviewed by a second member of the department of the rank of professor or associate professor. Grades are reported by number to the chief examiner who calls meetings of the examining committees to consider borderline cases. The departments are advised in advance which cases are to be considered and the representatives of the several departments bring the papers of the students in question to the committee meeting. The record of each of these borderline cases on the entire examination is considered

and the examination papers of certain cases are reviewed again. The action of the committee in passing on these cases is entirely impersonal but every possible effort is made to be fair to every student.

In order to progress from one class to another in the Medical School, a student must pass the comprehensive examination for the previous year. This means that he must have a "C" average on the year's work and no failures. If he fails to make this "C" average, he must repeat the entire examination. In order to prepare for a subsequent examination, a student may repeat the year's work or not, as he sees fit, but he is not permitted to take any work of the next year until he has passed the comprehensive examination of the previous year. There is only one exception to this rule and that is made very rarely. It is that a student who makes a "C" average on the entire year's examination, but has a failure in one course, may be given a conditional pass. This permits him to proceed with the next year's work but requires that he pass the examination in the particular subject in which he received the condition.

When this examination system was first inaugurated, students were permitted to repeat examinations as many times as they wished. Four years ago the number of trials permitted was limited to three on each year's work; that is, an initial examination and two retrials. Last year the faculty voted still further limitation of these trials to two each for the freshman and sophomore years. Three trials will still be permitted in the junior year. The purpose of this ruling, which becomes effective immediately, is to eliminate the weak students early in the course, rather than to have some of them, by repeated trials reach the junior or senior year and then fail.

#### RESULTS OF THESE EXAMINATIONS

Table 1 gives a summary of the results of the comprehensive examinations which we have conducted since 1935, the year the faculty ruling limiting the

TABLE 1. Comprehensive Examination Results (1935-1937 Inclusive)  
By Classes and Trials

|                  | First Trial |          | Second Trial |          | Third Trial |          |
|------------------|-------------|----------|--------------|----------|-------------|----------|
|                  | Number      | % Failed | Number       | % Failed | Number      | % Failed |
| Freshmen .....   | 390         | 24       | 106          | 41       | 41          | 51       |
| Sophomores ..... | 391         | 15       | 63           | 32       | 27          | 48       |
| Juniors .....    | 379         | 13       | 52           | 17       | 14          | 44       |

number of trials to three became effective. This tabulation shows a progressive decrease in the percentage of failures on the first trial from the freshman to the junior year and a progressive increase in the percentage of failures with the number of trials among students who take the examination several times. In this tabulation those students who became discouraged and dropped out before their last trial are included among the third trial failures.

Table 2 shows the proportion of failures on the first trial at these examinations from 1935 to 1937 inclusive. It will be noted that there is a decrease in

the percentage of first trial failures from the freshman to the junior class and a decrease in the failures during successive years from 1935 to 1937. We hoped that this would be true because as we select our medical students with greater care and set higher standards for admission, we should have a smaller propor-

TABLE 2. Comprehensive Examination Results on First Trial (1935-1937)

| Year       | Freshmen |          | Sophomores |          | Juniors |          |
|------------|----------|----------|------------|----------|---------|----------|
|            | Total    | % Failed | Total      | % Failed | Total   | % Failed |
| 1935 ..... | 142      | 28       | 135        | 19       | 131     | 17       |
| 1936 ..... | 126      | 24       | 126        | 14       | 120     | 17       |
| 1937 ..... | 122      | 19       | 130        | 11       | 128     | 7        |

tion of failures. In fact, if some such reduction does not occur, one suspects that passing grades are determined on the basis of a so-called normal distribution curve without regard to the changing ability of the student body as a whole.

Table 3 shows the number of students who were dropped from the Medical School for three failures on the comprehensive examination, or who became discouraged before taking this final trial. The percentages in the last column mean that 5.4 per cent as many freshmen were eliminated during this three-year

TABLE 3. Final Eliminations: 1935-1937 Inclusive

|                  | Failed Three Trials | Discontinued<br>Before | Total | Percent of<br>Number Taking |
|------------------|---------------------|------------------------|-------|-----------------------------|
|                  |                     | Final Trial            |       | Examination First Time      |
| Freshmen .....   | 9                   | 12                     | 21    | 5.4                         |
| Sophomores ..... | 6                   | 7                      | 13    | 3.3                         |
| Juniors .....    | 3                   | 3                      | 6     | 1.6                         |
| Total .....      | 18                  | 22                     | 40    | 10.3                        |

period as took the freshman examination for the first time, 3.3 per cent as many sophomores, and 1.6 per cent as many juniors. This makes a total elimination rate of 10.3 per cent during this three-year period.

#### ADVANTAGES OF THIS TYPE OF EXAMINATION PLAN

In order to be able to present a consensus of faculty and student opinion concerning these examinations, I requested an expression of opinion concerning the advantages and disadvantages of the plan from all professors and associate professors on full time and from a group of senior students selected from the top, the middle and the bottom of the class.

*Faculty Opinion.*—The chief advantages of this examination system mentioned by the faculty are:

1. "It requires students to review certain courses after they have had other courses."
2. "It necessitates review over a whole field after students have passed the course quizzes and examinations which are required in order to obtain eligibility for comprehensive examinations."

3. "More attention is given to the construction and the content of the examination questions because of the fact that they are scrutinized by a committee on which are representatives of other departments."

4. "Correlation of courses is stimulated by committee contact."

5. "The actual conduct and supervision of the examinations is much better than when examinations were conducted by individual instructors in lecture rooms which were frequently much too crowded."

6. "Greater care is given to the grading of papers because of the supervision of final results by a committee."

7. "The possibility of favoritism is eliminated because of the use of the number system."

8. "It insures a careful consideration of the status of examinees who have failed or nearly failed, with reconsideration of many papers in order to avoid too lenient or too strict grading practices on the part of individual departments."

9. "It tends to eliminate weak students some of whom would be able to squeeze through the ordinary course examinations."

10. "It eliminates irregularities in course work on the part of students."

*Student Opinion.* 1. "The chief advantage of the system is its complete impartiality. Grading is based upon actual knowledge and merit."

2. "Students may be examined on related material, even though this is not specifically covered by the course in which the examination is given."

3. "It trains the student to have at one time his entire year's work at his fingertips. . . . There is a better interrelation of subject material between courses if the courses are intensively studied during the same period. . . . The student's view must necessarily become comprehensive."

4. "It tests the student's ability 'to take it' . . . and rightly so, for those who are eliminated probably could not stand the gaff of professional practice."

5. "It stimulates a student to a complete review of a full year's work after various phases of the same question have been discussed by lecturers in several departments."

6. "It tends to make the student learn the subject rather than cram for the exam."

7. "It provides an opportunity to organize and coördinate the whole of the material given throughout the year. It brings the important points of the courses well in mind especially in those courses in which one is not expected to carry in one's head insignificant details."

8. "It forces a student to coördinate and integrate an entire year's work in one final review. The subject having once been learned and forgotten and then learned again sticks for a much longer time than it otherwise would have, even if the same total of the study time had been expended in the first learning."

9. "It is probably fairer than any other examination system. It requires more consistent study to pass and therefore probably produces better graduates."

10. "It eliminates the cramming that is naturally a part of the term, examination."

11. "It enables one to learn minute details during the course of the year and be carefully questioned on these finer points from time to time, but at the same time to allow the major examination to cover more important aspects of the work."

#### DISADVANTAGES OF THIS PLAN

*Faculty Opinion.* 1. "A tremendous strain is placed on the student during the examination period because of the great importance attached to his performance on this one examination. Our examinations have become as much a test of physical endurance as of a real knowledge of the subject or of mental acumen. . . . I think a few students have broken down during the examination period."

2. "Too great dependence is placed on a single examination, the results of which are inevitably not entirely indicative of the worth of the individual."

3. "Lack of consideration of personal factors such as illness, emotional disturbances, outside responsibilities, and the like."

4. "It is neither correlated nor comprehensive enough. . . . It does not permit much testing of ability to coördinate the various courses."

5. "It places too much emphasis on memory and application."

6. "Some students study too little until just before each examination."

7. "Discontinuance of classes three weeks before the end of the school year takes too much time out of the year's curriculum."

*Student Opinion.* 1. "Too much intensive study is required during the short period of preparation for these examinations."

2. "A written test neglects to a large extent the student's practical ability and is indicative only of his theoretical knowledge of the course. However, this is remedied at Minnesota by supplementing the written with practical, laboratory and oral examinations."

3. "Too much reliance must be placed on one examination. . . . The questions are not well formulated and are too few in number to permit a true sampling of the student's knowledge. . . . Grading depends too much on the personal opinion of the individual grading the papers. It is a known fact that no two individuals will give the same grade to the same answer. . . . The student at no time during the year knows whether or not he is doing passing work. . . . There is a tendency to discontinue the regular routine of studying and during the last month study just the questions of previous comprehensives." (This from a student near the bottom of the class.)

4. "The method is entirely too mechanical to choose men for a profession involving so much of a personal element. . . . It permits a student to let everything go to the last minute and then get through by cramming."



5. "Its chief and only disadvantage is the great mental and physical strain on the student. To realize that a whole year's work depends on two weeks of examinations is truly a responsibility. I am sure that at least 75 per cent of friends, including myself, develop neurotic symptoms during those two weeks which they had never exhibited before." (This from a student ranking first in the class.)

6. "An occasional good student might fail if he has two or three 'bad days' during the final week due to ill health or accidents in his family."

#### SUGGESTIONS FOR IMPROVEMENT OF THIS EXAMINATION SYSTEM

*From the Faculty.* 1. "Utilize the objective type of examination to greater extent than is done at present."

2. "Make the examinations more comprehensive in character."

3. "It would be an improvement to initiate practical oral examinations, if there were not so many students."

4. "The committee should be authorized to waive the rules for the occasional student who fails and to adjust the penalty in accordance with their determination of the factors of the case."

5. "Give greater care to the preparation of the examinations in order to avoid questions which require answers that are too long and too discursive."

6. "Introduce a new type of comprehensive examination, perhaps for two mornings at the end of the year, in which an attempt is made to test all that a student knows about a given region of the body; for example, the anatomy, histology, embryology, neurology, physiology, and biochemistry of the heart."

7. "The papers might be graded by someone other than the one who formulated the questions."

*Suggestions from Students.* 1. "Give more quarterly examinations and have comprehensive examinations at the end of the year cover broader aspects of the principles involved. . . . Permit some choice as to the questions to be answered; there is bound to be difference of opinion as to what is important and what is not."

2. "Give more care to the selection of medical students and eliminate less on examinations."

3. "Utilize the objective type of examination more extensively so as to cover a greater amount of material and eliminate personal elements in grading the answers."

4. "Clean house of musty and antiquated questions and acquire a new group, with the purpose of finding out what the student knows, not what he doesn't know."

5. "Consider the personality of the student. . . . thus weed out the unfortunate soul who works hard, is extremely brilliant, but of such a personality that no one will want him as a physician and a colleague."

6. "The examination of the junior year should be spaced over a longer period of time than one week."

7. "Give more examinations during the year and have these carry equal weight with the final comprehensive."

#### SUMMARY OF OPINIONS

Only one person out of the group of professors and associate professors is in favor of a return to the quarterly examination system. Several suggest that it might be well to try supplementing the present system with oral examinations. Others feel, and I believe rightly so, that in many instances more care should be given to preparation of the examinations, with a more general utilization of the objective type of examination. As a whole, however, faculty opinion is almost unanimously in favor of continuing this system essentially as it is being conducted at the present time.

Of the ten senior students whose opinions were invited, only one expressed himself as in favor of a return to the system of term examinations, and that one ranks next to the bottom of the class. Several others suggest quarterly examinations as supplementary to the present comprehensive system.

This expression of opinion from both faculty and students is an impressive endorsement of the examination plan which we are using. The system itself has certain shortcomings and its execution many more. All in all, however, this examination plan seems, at least in our situation, to be a distinct improvement over any other which we have used in the past; and if we exert constant effort toward its improvement, it should become increasingly more satisfactory.

## The Plan of Promotions in the First Two Years at the University of Oregon Medical School\*

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Many important studies have been made in recent years on the subject of this symposium. They have had to do chiefly with the general philosophy of examinations. Unfortunately, I have not had any direct contact with any of these investigations, and for me to present a paper before this group on the broad aspects of the question would be carrying coals to Newcastle. I beg your permission, therefore, to substitute a general discussion of the system now being used at my institution for solving some of the vexing problems of promotions in the first two years of medicine. And may I make it quite clear at the outset that even in presenting this material I am actuated far less by a desire to instruct than by a hope to learn through your discussions something of value that I may carry back to our faculty.

In the main, I suppose that our problems at the medical school do not differ in their essentials from those which exist at other institutions, but in some respects our institution is unique. The departments of the first two years are all one and two men departments, so that our preclinical faculty consists of about 12 professors, assistant professors and instructors, all of whom have very definite teaching duties and all of whom come in close contact with students. This group of men have always been very earnest and sincere in their desire to maintain a high standard of teaching, a high standard of achievement on the part of students, and yet, at the same time, they have been influenced no little in their treatment of the problem of promotions by their natural human sympathies with the aims and ambitions of the individual students with whom their contact is so close.

Previous to 1934, the faculty procedure in the first two years of the medical curriculum for determining promotion from quarter to quarter, from course to course, and from year to year was the more or less traditional one which merely considered the student grades independently turned in for each course. We did have for many years a so-called promotion board for each year, consisting of the teachers of the subjects of that year, which met at the end of each quarter and passed collectively on the status of each student. Of course, the chief interest centered about those students having low or failing grades. No machinery was in existence for regulating the basis on which the grades were arrived at. It was generally supposed that regular term examinations would be given and the grades on these would play a rôle in deciding the final term grade. There was also, at least in the later years, under this system, a general tendency to require

\*Read at the Forty-eighth Annual Meeting of the Association of American Medical Colleges, held in San Francisco, October 25-27, 1937.

an average grade of the student higher than that of the lowest passing grade. But, on the whole, the conduct of the promotion board was loosely regulated and there were many inconsistencies in its rulings. Personal and subjective factors undoubtedly frequently played a part, not only in determining the individual course grades of the student, but also in the decisions of the promotion board itself. The rulings themselves were very diverse. Students were dropped from the medical school at the end of every quarter from the first to the sixth; some were required to repeat large blocks of their studies from those of a quarter to those of an entire year; others were required to repeat individual courses; some were accorded the privilege of re-examination. It was seldom that the board finished any series of deliberations with anything approaching a consensus of opinion that its rulings had been entirely consistent with past rulings or that they had been fully consistent with the aims and ideals of the school regarding scholarship. Because of these facts and because of the curricular difficulties and the bookkeeping complexities which developed, the situation became so irritating and unsatisfactory that the preclinical faculty decided to make a study of the problem and devise a scheme that would get rid of some of the faults, at least, of the old system.

For nearly a year the members of the first two years promotion boards met at intervals and discussed various plans and procedures. Some study was made of the systems in use in other schools, and at the end of 1933, we adopted a scheme which is in its main essentials that which is in use at the present time.

I have taken the liberty to distribute to you some mimeographed sheets setting forth in brief outline the main points involved in our plan. In addition to the features given in this outline, the scheme includes many accessory provisions such as those for students who are not registered for a full curriculum, graduate students, transfers from other institutions whose previous studies do not correlate exactly with our curriculum, etc. These matters, however, usually concern only superior students and do not introduce special difficulties. The principal problem that is constantly arising is what to do with that 10 or 15 per cent of each class whose record in the medical school raises the question whether they should be permitted to proceed with the continuity of study as outlined in the curriculum, whether they should be dropped from the school, or whether some modifications of their future program should be required of them.

May I call your attention to the items on the outline in your hands and discuss briefly some of the practical problems which have arisen in our meetings in regard to them.

1. A written examination is given in June of each year in each of the major subjects of the year. This is called the annual examination. Eligibility to take the examination is determined by the professor in each course. All examinations must be taken.

2. Questions are reviewed by the Promotion Board (consisting of the instructors of the year) before the examination.

3. Papers are graded by number and the grades reported to the chairman of the Promotion Board.

4. After recording the grades the grade sheet is returned to the professor with students' names added.

5. The professor substitutes for the examination grade any grade he sees fit on the basis of class records, personal impressions, etc., and returns the sheet to the chairman of the Promotion Board.

6. The Promotion Board meets with all grades before it and passes on the status of students.

7. Students who have not failed in any subject and whose average grade is IV or better (passing grades are I, II, III, IV and V) are promoted to the next year.

8. Students who have failed in any subject or whose average grade is less than IV are considered as failing the annual examination and are required to take the examination again in September. Students failing both the June and September annual examinations are dropped.

9. Students who pass the September examination are promoted.

10. The Promotion Board is empowered to change any grade with the consent of the professor concerned.

11. Students are informed only of passing or failing, not of their exact grades.

At first it was intended that this written examination, called the annual examination, should be the sole basis on which promotions were to be based. It developed, however, that some instructors felt that an injustice was done to students in considering the class records only for the purpose of determining eligibility to take the examination. At the end of the first year, a revision was made in the scheme which permits the professor to alter the examination grade on the basis of any other information he may have about the student. However, in the meeting of the Promotion Board the examination grade and altered grade both are presented for consideration. In practice, changes of more than one point have been rare and for the most part the changes have affected the average grade of the student very little. These changes by the instructor have chiefly been limited to grades in the higher brackets.

The changes in grades made in the promotion board meeting itself are of more importance in our system. They have to do entirely with the lower bracket grades and are, primarily, for the purpose of adjusting the record of the student to the rulings of the Promotion Board. In practice, these changes consist in raising individual grades from a failure to the lowest passing grade or at most from a V to a IV, after reaching the conclusion that his whole record is such as to entitle him to promotion to the next year without restrictions. This action is based on the assumption that it is the general progress of the student in the study of medicine which should determine his status rather than his achievement in any particular course. In other words, it is felt that if a student has attained

an average or higher grade in most subjects, a slightly lower than passing grade in one subject is not sufficient cause for creating the serious disturbance in his course of study which would be the result of requiring him to repeat that course.

Other advantages of the new system are that it does away entirely with the former custom of determining a student's status at the end of each quarter. We have felt that a student deserves at least the full first year to acclimatize himself to the change from the arts college to the medical school. Likewise, if he is deemed worthy of going on into the second year, he is probably deserving of a full year's trial. It eliminates also the rather hopeless situation of a weak student trying to repeat subjects and yet eventually catch up and graduate with his class. On the other hand, it makes provision for the student who acquires information slower and with more difficulty than others by permitting him to repeat his examinations after a three months' period of review. We have had a few students who have had to do this in both the first and second years and have, nevertheless, gone into the third year and met with no difficulty with the third year promotion board. In fact, it has not infrequently been remarked by students themselves that failing the June examination, spending the summer in review, then passing the September examination, has brought them to their next year's studies better equipped, on the whole, to carry those subjects successfully than it has students who barely passed the June examination and who, of course, spent the summer without thinking of studies.

It is, of course, obvious that the so-called annual examination, which is a written examination, constitutes a very important part of this plan of promotions. It naturally follows that the justice and validity of the scheme depends to a considerable extent on the quality of the examination which is given. There are certain features, however, which seem to me to reduce the dangers inherent in this and safeguard the interests both of the student and of society. It is seen that promotion depends in a less degree on individual grades than on average grades. This tends to discount to a considerable extent subjective and personal features which may enter into the marking of any one paper. The opportunity to repeat the examination without prejudice because of previous failure reduces the possible influence of chance factors in determining the student's status.

These assumptions being accepted, however, it still seems clear that much depends on the quality of the examination, and I must admit that, so far, our group has given relatively little attention in its meetings to this important subject.

The review of questions preceding the examination doubtless has some salutary effect. The questions are probably prepared, on the whole, more carefully with a view to clearness and fairness than was formerly the case. So far, in our small group, there has been little disposition to challenge questions on the basis of their appropriateness or their degree of difficultness. However, there is some indication that this early diffidence will wear off and that eventually a much freer criticism of questions will be the rule. At least, I believe we get from each other in these meetings much that is of value regarding the preparation of questions.



There has been little or no discussion in our group regarding the relative values of different types of examinations such as the essay type, the objective type, or the modification of the essay type which retains its alleged value in estimating the student's power of reasoning and correlating and at the same time carries some objective elements. All of these types of examinations are given, however, by different instructors, and I am inclined to think that the ultimate result of our contact with these different methods will be an improvement in the quality of our examinations. I doubt whether most individual professors in medical school faculties will ever take the time to study thoroughly and disinterestedly the many valuable contributions that have been made to the subject of examinations, but they can probably be brought gradually, in such meetings as ours, to the point of losing many of their prejudices and eventually adopting more reliable methods.

I should make it clear that this scheme of promotions which emphasizes the annual examination is in no sense intended to limit the use of the examination as a teaching mechanism. Indeed, in all of our discussions the value of frequent examinations of various kinds, including the written, the individual oral, the group quiz, and the practical laboratory test, has been stressed.

Personally, I regard examinations as of the highest value for diagnosing student difficulties, for evaluating methods of teaching and for guiding students toward their proper goal through the maze of facts and information which beset their paths in every medical science. It is easy, indeed, to lose sight of this goal in the wilderness of scientific discovery which borders every step of their progress.

It has not been noted that the importance attached to the annual examination has affected, in any way, the attitude of the student toward these teaching mechanisms. The serious minded young men and women who gain admission to the medical school respond interestedly to any opportunity to test their own proficiency.

As I have already said, I do not present this scheme as one that is, even in our institution, entirely satisfactory. So long as faculties are human, and I hope they will long remain so, I doubt if any scheme can be found that will be 100 per cent acceptable at all times. The reasons for this lie, partly, in the fact that, in considering the promotions of students in the medical school, faculty members are actuated by two motives that are often in conflict with each other. The one is that impersonal, somewhat remote aim of medical education to turn out a product that promises gradually but certainly to improve the quality of medical practice. If this were the sole motive we could probably cease to worry about whether any student in the lower grade brackets should pass or fail. Our objective would probably be better served if such questionable students were dropped and their places given to those promising young men who are eagerly seeking admission. But there is another motive that influences faculty action, and I am sure that everyone is agreed that it does so justly. It arises from the general feeling that once a student has been admitted to the medical school there is accepted by the school a moral obligation to do all it can to help him succeed.

The natural human desire to feel that this obligation to the student has been fully discharged is, I believe, at the basis of the reluctance so often seen to drop poor students. The fear that our mechanism for deciding the question of whether a boy is likely to become an inefficient or a good doctor may have serious flaws and result in injustice to the individual student is constantly with us. The interests of society are sometimes difficult to keep in mind in the presence of a natural sympathy for the earnest, sincere and hardworking lad whom we have known personally for a year or more.

That our system has not been wholeheartedly accepted in its entirety is made more obvious by the fact that only this fall five students who would have been dropped under the rules have been permitted on their earnest petition to re-register in the first year class. This was done in face of the fact, statistically supported in our own institution in past years, that three or four of these men are very likely to fail again at the end of the year. If this should turn out to be the case, if one or even two of these men succeed in graduating from the medical school, has the sum of injustice done to them been of greater or less degree than if all five had been dropped summarily?

We are still groping for light on many of these questions. Our system is imperfect, but we believe that it has in it elements which will make for its continual improvement.

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## A Superior Written Examination (Objective Type) As Applied in the Medical School\*

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### 1—MEDICAL EXAMINATIONS

Their purpose and importance. The types in use. The existing defects. The need for improvement. The traditional essay type versus the newer objective type examination.

It is well appreciated, I am sure, that one of the most important problems of education is the method devised and used to measure achievement: THE EXAMINATION.

Examinations comprise an essential part of any educational program. They provide the opportunity and are the means of taking inventory from which one hopes to learn the extent of understanding and appreciation of the subject matter taught and studied as demonstrated by the student or examinee. Examinations should go hand in hand and keep pace with instruction for they are so closely related as to be interdependent.

The benefits to be derived from good examinations are many and far reaching; and they are important to all concerned.

To society they act as a safeguard.

To the college and faculty they are a means by which standards may be obtained and maintained and teaching may be controlled and improved.

To the students they assume the greatest importance, for it is largely through examinations that they are permitted and able to demonstrate their qualifications.

The chief function of the medical school is the teaching of medicine but, at the same time, a definite superimposed obligation to society must be recognized and assumed. The primary objective of the medical examination is, therefore, obviously the qualification of each individual student for entrance to, advancement in, and graduation from the school, and later, for licensing to the practice of medicine by the various state and national boards of examiners. These duties, with their associated responsibilities and obligations, cannot be taken lightly, and though all are important, the obligation to society seems paramount. For her own protection, she demands and deserves first consideration. Does she always get what she deserves? Too often, it seems, her interests are sacrificed or at least become secondary to a personal interest in the school or student. This apparent betrayal of trust, if real, should be accounted for, the contributing factors sought and, if identified, should be eliminated as far as possible. Many reasons to account for this situation suggest themselves, the outstanding one of which I believe to be the character of the examinations in use today.

The chief concern of any individual who is obliged to make an important

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decision relative to the qualification of a student should be, and is, to see that it is fair to all concerned. If the examinations on which these decisions are made, are unfair, justice cannot and will not prevail.

For a long time there has been displayed progressively diminishing confidence in the traditional medical examination. Much work (Kardel, Wood and others) has been done in an effort to improve examinations and examination methods throughout the world. The incentive has been, during the past twenty-five years, a well justified and ever increasing realization of the inadequacy of the existing methods. Many criticisms of the old type examination have been recognized as valid and much in the way of improvement has been offered in the new. Up to the present time, however, the medical school has participated little or not at all in this movement, and it seems singular that the medical profession, which is one of, if not the most progressive of all professions, should be the last to employ the improved examination methods available.

The examinations in use today in the medical schools of this country include the written and oral forms. Either or both are used. It is significant, however, how seldom the oral examination alone is used.

In the fall of 1936, through information obtained by questionnaire from 70 medical schools, it was learned that ninety-two per cent of the schools use final written examinations in the major subjects of the senior year.

53 per cent, or 37 schools use both written and oral examinations.

39 per cent, or 27 schools use written examinations alone.

92 per cent, or 64 schools use written examinations.

8 per cent, or 6 schools use oral examinations only.

Many of those schools which make use of both written and oral types of examinations have a written final examination only. This, in conjunction with the grades obtained by oral interview or quizzes held at intervals throughout the year, determines the final grade.

This fact, in itself, suggests a predominating preference for, and almost complete agreement as to the superiority of the written over the oral examination.

Further, it was learned that in 95 per cent of instances the written examination was comprised, for the most part, of the usual essay type question. This type, as usually used, demands almost exclusively, unreasonable and uncontrollable discussion, description, explanation and differentiation. The traditional essay question is well known and is, no doubt, used so extensively because of the ease with which it is constructed. Several examples are here shown in order that the type under criticism may be identified. They have been taken from the written part of the National Board Examinations in surgery given during the past five years; and have been selected from this particular source not because they are better or worse than others, but only because:

They are typical examples of the type of question in general use and under criticism.

As a surgeon I am most interested in questions originating in, and pertaining to, the department of surgery.

Their source is the outstanding board of examiners in this country today.

The examinations from which they are taken are better and more generally known than any other single college or state board examination.

EXAMINATION QUESTIONS—PART TWO SURGERY—NATIONAL BOARD  
OF MEDICAL EXAMINERS

1. Discuss briefly, acidosis and alkalosis from a surgical point of view. (Sept. 1932).
2. Discuss the causes and treatment of non-union in fractures. (June, 1933).
3. State the reasons for and outline the treatment of non-union of fractures. (Sept. 1933).
4. Discuss the use of antiseptics in surgery. (Feb. 1934).
5. Give in detail, the symptoms, differential diagnosis and treatment of internal (intra-abdominal) hemorrhage. (June 1934).
6. Discuss the presumptive causes of death as the result of burns. (May 1936).
7. Give the causes and differential diagnosis of chronic enlargement of the lymph nodes of the neck. (Sept. 1936).
8. Discuss postoperative abdominal distention. (Sept. 1936).

Although this type of question is in universal use throughout the medical schools, it has been proven that it is unfair in that it is inadequate, invalid and unreliable.

Before embarking on a discussion relative to the defects of the essay type question and the merits of the objective type question, it seems only fitting to call attention to the fact that some thirty years ago Professor J. McKeen Cattell<sup>1</sup> of Columbia University appreciated the need of a scientific study of examination methods and results. His remarks are worth quoting:

"In examinations and grades which attempt to determine individual differences and to select individuals for special purposes, it seems strange that no scientific study of any consequence has been made to determine the validity of our methods, to standardize and improve them. It is quite possible that the assignment of grades to school children and college students as a kind of reward is useless or worse; its value could and should be determined. But when students are excluded from college because they do not secure a certain grade in a written examination, or when candidates for positions in government service are selected as a result of a written examination, we assume a certain responsibility. The least that we can do is to make a scientific study of our methods and results."

Kandel<sup>2</sup> reminds us that this challenge "laid the foundation for the subsequent study of the problem of examinations and still later for the development of objective methods of testing." Although this challenge did not originate from within, nor was it particularly directed toward professional schools, it did then, and does now, apply to the examinations of all schools.

1. Cattell, J. McKeen: Examinations, Grades and Credits. *Popular Science Monthly*, 66:367, 1905.

2. Kandel, I. L.: Examinations and Their Substitutes in the United States. Bull. No. 28, *The Carnegie Foundation for the Advancement of Teaching*. P. 59.

It has been known quite generally, for a long time, that the traditional medical examinations as used are defective in many ways. These defects are the sources of well deserved criticism as has recently and forcibly been brought to our attention by Wood<sup>3</sup> of Columbia University.

The chief objections to the essay type examination, on which criticism is justly focused, are:

- (1) It is highly subjective.
- (2) It is inadequate.
- (3) It is impossible to grade reliably.

#### SUBJECTIVITY

That subjective factors influence unfavorably the validity and reliability of any examination is beyond question. That the essay type is highly subjective throughout, is equally certain because of the personal equation involved in the selection of subject material, the wording and weighting of the questions, the interpretation of the resultant answer, the reaction to organization, expression and writing, the significance attached to errors, the evaluation of the answers and interpretation of resultant grades. It is difficult to believe that any amount of care in grading can overcome these factors.

#### INADEQUACY

Wood<sup>4</sup> says: "... the measurement of reasoning and organizing ability in a field of knowledge would be very defective and incomplete without a measurement of the breadth of information in that field. Breadth of information cannot be tested with the essay form of examination in a three hour period, for the single reason that on physical grounds only so many pages of prose may be produced in three hours."

The medical essay examination usually consists of only a few questions which, as a rule, must be answered in a three hour period. Therefore, of necessity, wide and adequate sampling of the subject content on which the examination is based is impossible. The number of questions determines the comprehensiveness of the examination. When few are employed each one assumes in weight a large proportion of the total score and in this way chance often plays a tremendous part in determining the final grade.

An examination comprised of few questions (1 to 8) cannot be adequate and must be, for this reason, unsatisfactory and unfair.

#### UNRELIABILITY

The fact that the essay question is impossible to grade reliably is common knowledge. It has been proven over and over again by numerous investigators in elementary schools as well as in those of higher education. The wide discrepancy shown in grades assigned by different examiners of the same manu-

3. Wood, Ben D.: *Fundamental Purposes, Methodology and Technics of Examining in Relation to Medical Education and Licensure. Pro. Annual Congress on Medical Education and Licensure*, Chicago, 1937, p. 43.

4. Wood, Ben D.: *Measurement in Higher Education*. P. 162 f. (New York, 1923). See also Ben D. Wood and F. S. Beers, "Knowledge versus Thinking?" *Teachers College Record*, 1936, p. 487 ff.



script is so easy to demonstrate that this defect early became the most outstanding and convincing of them all.

Years ago Starch<sup>5</sup> at the University of Wisconsin, and Sandiford<sup>6</sup> at the University of Toronto, demonstrated the wide variation in opinion as to the relative worth of manuscripts written in answer to essay questions as used in the Colleges of Arts and Science. More recently, investigating the same problem in the medical school of the University of Buffalo, I came to the conclusion that:<sup>7</sup>

"Generally speaking, the essay type of question is so poorly designed that it is impossible to grade with any appreciable degree of accuracy or reliability. Sincere efforts to grade reliably 128 essay question manuscripts (submitted by 64 students) by eight competent examiners proved futile, though a greater than usual attempt at unified estimation was made. Grading of the same manuscript by four different examiners resulted in a tremendous variation of grades. The point spread between the highest and lowest grade assigned each manuscript was more than ten points in 60 per cent of instances and more than fifteen points in from 34 to 53 per cent of instances, depending on which group of examiners is considered. The grade variation between the two groups of examiners (four each) was manifested in no lesser degree, and correlation between the two groups was conspicuous by its absence. No relationship between the two questions was suggested, though they were both important medical subjects. Examiners grading the same lot of manuscripts after several months' lapse of time showed tremendous variation in their own grades, which completely changed the status of a sizeable proportion of the class. Reliability in grading was in no way improved by grading in groups instead of by percentage grade.

"Forty-four, or 60 per cent of the class of sixty-four students, were questioned or failed by one or more of the eight examiners, but, on analysis, practically all failures were unjustified if the consensus of all participating examiners was used as the determining factor. In this demonstration, at least, it was shown quite conclusively that the resultant grades on manuscripts written as answers to typical essay or "discuss" type medical questions were thoroughly unreliable and were of little or no use in determining the general ability of a student on either an individual or competitive basis. Because of the marked variation in assigned grades shown among the examiners of the same department as well as between the two departmental groups of examiners, it was concluded that the more examiners participating, the greater the confusion and the more impossible it becomes to arrive at a valid estimate of the knowledge displayed in a given manuscript."

There are many other defects more or less related to the three just mentioned, but to devote further time and space to their discussion seems unnecessary. It should be sufficient to say that the essay examination in general use, and as used in the medical schools, is unfair as well as unsatisfactory. Marked modification and improvement seems imperative.

This destructive analysis of, and attack on, the old essay type examination would be inexcusable were we not able at the same time to offer in substitution a newer and better type, one more adequate, more valid and more reliable; one in which the subjective factors are, in so far as is possible, eliminated in favor of objectively measurable standards.

I refer to the NEWER OBJECTIVE TYPE EXAMINATION.

To those readers interested, I would like here to recommend the careful reading of

5. Starch, D.: Reliability and Distribution of Grades. *Science*, 38:930 ff., 1913.

6. Sandiford, P.: Educational Psychology, p. 303 (New York, 1928).

7. Dobbie, R. P.: The Essay Examination 'On the Spot,' *Proc. Annual Congress on Medical Education and Licensure*, Chicago, 1937, pp. 51.

a recent bulletin (No. 28) of the Carnegie Foundation for the Advancement of Teaching, entitled "Examinations and Their Substitutes in the United States." Mr. Kandel's study summarizes, in admirable fashion, the various types of examinations in use, their history and progress. In his "Attack on Examinations" he discusses thoroughly and in a comparative manner the essay type and objective type examinations.

Let us consider the advantages claimed for THE NEWER OBJECTIVE TYPE EXAMINATION and why it is demonstrably superior. Kandel<sup>8</sup> states them in a manner which is hard to improve on, as follows:

"(1) It more nearly meets the standards of definable validity, that is, it measures to a known degree what it is designed to measure to the exclusion of factors irrelevant to this particular end.

"(2) It is statistically more reliable in the sense that the scores on two equivalent new type tests given to the same pupils agree more closely than do the scores on two supposedly equivalent essay style tests of equal length.

"(3) It is more objective since subjective factors such as bias, prejudice, personal opinions, and temperament are reduced to a minimum and the scores are so accurate and consistent that they would always be the same no matter what the number of examiners might be.

"(4) It is accurate in the sense that the units of measurement are more nearly equal at all points of the scale.

"(5) It is more comprehensive because it includes a wider sampling of the subject of the examination and to that extent is also more reliable.

"(6) It is easily administered and marked with economy of time and effort for both examiners and pupils, but it requires more time to prepare than the traditional examination so that the standards of scientific measurement may be adequately met.

"(7) The results can be interpreted more easily and used for specific purposes of improving weaknesses discovered in pupils or encouraging ability."

Just as the defects and criticisms of the essay type hinge on the fact that it is highly subjective throughout, so the advantages listed and claimed for the newer type examination center around the fact that the questions therein are designed to be objective rather than subjective in type, hence the name: OBJECTIVE TYPE EXAMINATION.

Kandel<sup>9</sup> discusses this phase briefly and pertinently as follows:

" . . . since the answers must be short and specific the irrelevant factors, which according to investigations may distract attention from the real marking of the essentials, are removed or reduced to a minimum. This means in turn that the personal equation or subjective opinion does not affect the judgment of the examiner. The marking or scoring is thus agreed upon by competent examiners. The results are more accurate because only one variable, whether the answer is correct or incorrect, is measured at a time."

8. Kandel, I. L.: Examinations and Their Substitutes in the United States. Bull. No. 28, *The Carnegie Foundation for the Advancement of Teaching*, p. 85.

9. Kandel, I. L.: Examinations and Their Substitutes in the United States. Bull. No. 28, *The Carnegie Foundation for the Advancement of Teaching*, p. 81.

There are further advantages to be gained through the unlimited possibilities offered in the variation and design of questions. These assume considerable practical importance, for, comprised of numerous questions designed and varied so that each demands a specific solution or answer, it is far more interesting and stimulating to the student and each question or problem, like each patient, is a direct challenge to the examinee.

When one has so long appreciated the existing limitations and defects of the essay type examination (as all experienced examiners have) and then sees these same defects eliminated to a great extent by use of the objective type, it is difficult, indeed, to understand why this newer method was not long ago eagerly adopted or, at least, given a thorough trial by the medical profession. Either the evidence suggesting the superiority of this type of examination has not been presented convincingly, or there are other circumstances or factors to account for the apparent disinterest which has prevailed up to the present time.

Several factors which suggest themselves as possible explanations for this inertia are, complacency of all parties concerned; ignorance of the available improved methods; unwillingness or lack of interest and initiative in making any radical change in examination methods; lack of cooperation; lack of experience in the design and use of the short answer question; inability or lack of desire to devote the time and care required in the construction of such an examination; prejudice (based on misunderstanding and false premises) against the short answer question.

Though several or all of these factors play a rôle, naturally, few will be admitted. Those who refuse or are reluctant to abandon the traditional examination for the objective type, reason that regardless of its faults and weaknesses, one is better able to estimate the knowledge a student possesses by analyzing the thought displayed in essay form. In my experience, this is the one and only plausible criticism advanced by all who object to the improved examination. It is not valid and cannot be taken seriously. It has been refuted by many investigators.

Kandel,<sup>10</sup> in his discussion of the new type tests, says:

"Those who are inclined to criticize the new type test on the ground that it only tests memory and not the 'higher processes' of thinking either minimize the importance of a knowledge of facts and information as the necessary material for thinking or rely on a psychology which cannot be defended. One may have the capacity to think but that capacity is idle without a thorough and comprehensive mastery and retention of knowledge and ideas which can only grow out of knowledge. The case for the new type test has been excellently presented by Dr. William S. Learned:

"How will it profit us even in case we do secure a trustworthy index of a student's knowledge? In short, just how indispensable is knowledge in education?

"There appears to be no way of evading the primary truth that thinking, which is assumed to be the fundamental process in education, if done at all, must be done by ideas or concepts which the mind presents on demand of any given need or situation. Furthermore, the success or satisfaction resulting from thought will clearly be in such proportion as the concepts thus provided are adequate both in number and in clearness

10. Kandel, I. L.: *Examinations and Their Substitutes in the United States*. Bull. No. 28, *The Carnegie Foundation for the Advancement of Teaching*, p. 83.

of definition. A "resourceful" mind is one which, at each step of its procedure, is supplied automatically with such a variety of clear-cut, relevant suggestions that its problem becomes one of selection. Several possibilities are normally present—and present in such form that a choice can be made intelligently because each possibility assumes to the main situation relations that are sharply defined. The ineffective mind, on the contrary, offers little or nothing to meet a need; its proposals are either hearsay recipes that have no real application or else are so vague and cloudy as to be worthless.

"The test of education is therefore plain. Its business is, first, to increase the material which the mind thus has ready for use. To this end it seeks to expose the student to important facts, ideas, and values as widely as these can be effectively appreciated and absorbed. Second, and far more important, it must ensure the availability of this store of material by progressively refining and clarifying its meanings. Through frequent restudy and redefinition of the ideas themselves, by approaching them deliberately and repeatedly from fresh points of view, an understanding of their bearings and interrelationships gradually matures and becomes an increasingly vivid possession of the student."<sup>11</sup>

Kandel<sup>12</sup> handles this particular criticism in a way worth quoting.

"The criticism is based, furthermore, on an assumed requirement that all the steps in a process of reasoning should be presented, as is expected in an essay, as well as the end-product, without realizing that this end-product must have been reached by a process of reasoning even though the steps are not written out in full.

"As for the argument that the essay examination measures thinking, while the objective test measures *mere* memory, more heat than light is generated by its advocates. The proponents assume, usually unconsciously, that a student must present the steps in his reasoning before they will accept the end-product as more than mere association. It is no weakness in the objective test that it demands of the student that he shall do his thinking subvocally and without movement of the wrist in writing before indicating the end product of his thinking'.<sup>13</sup>

It is unlikely that anyone believes the traditional written medical examination to be satisfactory. The defects in the essay type and the superiority of the objective type, as I have tried to show, have been satisfactorily and repeatedly demonstrated in most, if not all, of the schools of higher education with the exception of the medical school. It would seem improbable that these demonstrable facts do not apply equally well to medical examinations. It is perhaps only natural and proper, however, that the old should not be abandoned for the new until such time as the advantages claimed for the newer type can be proven to exist in the written medical examination. After all, "experience is the best teacher." From such experience I am convinced that a careful and conscientious trial of the objective type examination will not only dispel prevailing prejudice, but will clearly demonstrate its superiority.

11. Learned, W. S.: Testing for Values in Education, pp. 2f. in Reprint from the *Bull. Assoc. Am. Colleges*, 20, No. 1, March, 1934.

12. Kandel, I. L.: Examinations and Their Substitutes in the United States. Bull. No. 28, *The Carnegie Foundation for the Advancement of Teaching*, p. 84.

13. MacLean, M. S.: The Problem in the General College. *Studies in College Examinations*, p. 14 (University of Minnesota, Minneapolis, 1934.) Kandel, I. L., Examinations and Their Substitutes in the United States. Bull. No. 28, *The Carnegie Foundation for the Advancement of Teaching*, p. 84.

## II. THE COMPREHENSIVE OBJECTIVE TYPE EXAMINATION AS USED IN THE UNIVERSITY OF BUFFALO SCHOOL OF MEDICINE

### Construction, Composition, Administration and Grading.

At the University of Buffalo, for the past four years, we have used and developed the objective type medical examination. It has been enthusiastically accepted and endorsed by the students and faculty of this school and of the several other schools in which it has been tried. It is, in our own opinion, superior in that it is more comprehensive. Consisting entirely of short answer "objective test" questions, it requires in the answering a maximum amount of thinking and a minimum amount of writing. The ability to estimate knowledge and judgment, as well as the power of correlation and interpretation, is in no way sacrificed. It must be, and is, designed with the greatest of care, but the effort required is fully compensated in that it can be graded or scored quickly, easily and, most important, reliably.

It has demonstrated to our complete satisfaction that this type of examination is particularly well adapted to the medical curriculum and if carefully prepared and properly administered is superior and practical.

In an effort to stimulate and encourage its use in other medical schools, and so that those interested may receive any benefits which our experience in this field may contribute, it seems appropriate that the examination be demonstrated as briefly as is consistent with a practical understanding.

Certain primary principles which influence the examination, as a whole, must be emphasized and borne in mind. It should constantly be appreciated that,

A. The character of the examination depends on its basic unit, *the question*. For this reason extreme care in selection and construction is required.

B. The comprehensiveness and length of the examination is determined by its inclusiveness as manifested by the type and number of questions comprising it. If the subject material is well selected and the questions well designed, their number determines the comprehensiveness of the examination and for this reason, and within reason, the more comprehensive the examination is, the more adequate and reliable it will be.

C. Objectivity and validity must be displayed to the utmost in the construction of each question in order to insure those same qualities in the examination as a whole.

It is, therefore, necessary to emphasize and demonstrate at some length that most important and time consuming phase, *the construction of the question*.

It is commonly assumed by those who have had little or no actual experience with the objective type examination as applied in the medical school, that it is, for the most part, comprised of a large number of short questions to be answered by "yes" or "no," plus or minus, check mark, etc. For this reason, it is often also assumed, with disapproval, that it can only be a guessing contest which at best tests memory and factual knowledge alone. This is the impression encountered



everywhere and, naturally, in large degree accounts for the prevailing prejudice. It is quite easy to correct this erroneous impression and it can best be accomplished by enumerating a few of the essential principles or rules necessary to the construction of good questions and the setting forth of several examples.

The amount of knowledge and intelligent thought required of a student in the answering of objective test questions depends entirely on their construction. To construct good questions requires much time, and their effectiveness depends on the ingenuity of the individual making out the questions as well as the amount of care and effort expended. Almost any competent instructor who is interested enough to give the time should be able to design them. A certain amount of experience is necessary in order to avoid pitfalls but this is readily acquired. There is a degree of fascination about this part of the work which one can only appreciate by doing it. Some individuals will find it easier than others and a few may find it impossible. Unwillingness or inability to give the time, and impatience are the chief obstacles.

It would seem that the most desirable questions are those which, in addition to testing knowledge based on facts, demand varying degrees of interpretation, correlation and judgment. Though questions requiring the simple answer "yes" or "no" are acceptable, they have been considered the least desirable type and their use in our examination is kept at a minimum. Because the character and validity of each question reflects on the examination as a whole, it is of the greatest importance to keep in mind and adhere closely to certain axioms:

- (1) Although there is no limit to the length of, or space utilized by, the question itself, the answer required must be specific and relatively short.
- (2) Each question must be clear and should in no way be "tricky" or ambiguous.
- (3) The thoughts or answers which the question is designed to elicit must be clearly indicated though at the same time they must not be too obvious.
- (4) The answer required and acceptable should be (and almost always is) the only answer which can be considered correct as previously agreed upon by several independent examiners.
- (5) Each question must be practical and of some importance.
- (6) The questions should vary in type and design.
- (7) The questions should vary in quality or degree of difficulty. Some should be easy (inferior), others difficult (superior).
- (8) Each question should be weighted according to both difficulty and importance.
- (9) The questions should be balanced so that too much time, stress, and weight is not thrown upon unimportant subjects or phases of subjects. (This balance naturally varies with the individual making up the examination and great care must be taken to avoid undue emphasis being wrongly placed.)
- (10) The entire examination should be constructed and weighted propor



tionately so that it, like each question, will be well balanced, comprehensive and inclusive.

It will probably be thought by many that care and attention to details of question construction has been over-emphasized and exaggerated, but I assure you that it has not, for in spite of every precaution to fulfill the essential demands enumerated and every effort to preclude error as well as assure specificity of answer, one will, with his first attempt to formulate questions, encounter and appreciate unforeseen difficulties which must be overcome, and to surmount which, will necessitate repeated modification and testing of a question before it attains the degree of validity required to permit its inclusion in the examination.

The sample questions here demonstrated, with comments, are a few taken from the surgery part of the examination. They will help to show the suggested possibilities: (Attention should be called to the fact that in the example questions immediately following, adequate lines and space for desirable answer insertion have not been furnished but such space has been contracted or omitted to conserve space in this printing).

#### EXAMPLE QUESTIONS

No. 1. (1) Pain

(2) Vomiting

(3) Abdominal distention

(4) Obstipation

(a) The above numbered items are the most constant signs and symptoms of what acute surgical lesion? .....

(b) Account for the absence of item No. 2 in many cases: .....

(c) Account for variation in extent of item No. 3 in many cases: .....

(d) Account for the absence of item No. 4 during the first twenty-four hours in some instances: .....

(e) What are the *two* most frequent causes of this lesion? .....

In the consideration of this question (No. 1) it will be observed that it is designed to test a student's understanding of the mechanics of acute intestinal obstruction in relation to, and as manifested by, the clinical signs and symptoms displayed. In this instance particularly to the relation between the manifested clinical signs and symptoms on the one hand, and the time element and site or level of obstruction on the other.

A satisfactory answer would show considerable knowledge of the subject in a form easily recognized and reliably appraisable.

The same question in essay form would in all probability read something like this: "Discuss or explain the variation in intensity of the clinical signs and symptoms seen in acute intestinal obstruction." In response to the question in this form, one would have pages of writing, much of it illegible, in which the student would ramble on as long as, or longer than, time permits, in an effort to include everything he can think of which in his opinion might pertain to acute intestinal obstruction. As we all know, the desired information, if present in this form, is difficult to recognize and impossible to reliably evaluate.

- No. 2. (1) Head trauma, followed by  
 (2) temporary unconsciousness, followed by  
 (3) lucid interval (2 hours), followed by  
 (4) progressively increasing stupor and unconsciousness.

(a) The above sequence of events comprises the **TYPICAL HISTORY** elicited in cases of: .....

(b) Account for item No. 2.....

(c) Account for the presence of, as well as the variation in time of, item No. 3: .....

(d) Account for item No. 4:.....

(e) What is the treatment?.....

Question No. 2 demands an understanding of middle meningeal hemorrhage. The typical signs and characteristics of the syndrome have been given. The satisfactory answer to the various parts of this question requires correlated knowledge of the anatomy, as well as the physiological and pathological changes occurring which account for the signs and symptoms produced. The student's reasoning power based on this understanding is further checked by the suggested treatment. Compare this question as given, with a similar one in essay form reading: "Discuss middle meningeal hemorrhage." Compare the information elicited by the two forms of the same question. Compare the specificity and validity of the two answers. It is not difficult to appreciate how much more easily and reliably the one can be graded than the other. Such consideration and comparison is obviously in favor of the objective type.

No. 3. Name the most common pathological lesion for which each of the following *diagnostic* or *therapeutic* procedures would be done. (Be specific.)

| <i>Procedure</i>                   | <i>Most common lesion</i> |
|------------------------------------|---------------------------|
| (a) Cholecystogastrostomy: .....   | .....                     |
| (b) Gastrostomy: .....             | .....                     |
| (c) Spinal fusion: .....           | .....                     |
| (d) Hepaticoduodenostomy: .....    | .....                     |
| (e) Transurethral resection: ..... | .....                     |

This question (No. 3) on first consideration looks quite simple, yet on study will be seen to require, in addition to adequate familiarity with medical nomenclature, a correlated understanding of each therapeutic procedure and a knowledge of the pathology, location and frequency of certain lesions as well as the treatment indicated. With this type of question the sampling of knowledge over an extensive field can be accomplished thoroughly, easily and rapidly.

No. 4. What is the differential point in diagnosis between facial palsy of peripheral and central origin? .....

As designed, this question (No. 4) requires the condensation of pertinent facts with the necessary correlation of knowledge in neuro-anatomy, neurology and clinical medicine. The space provided is adequate for a satisfactory answer and automatically eliminates much irrelevant discussion.

- No. 5. (1) Temperature  
 (2) Pain  
 (3) Leucocytosis  
 (4) Tenderness, right lower quadrant  
 (5) Nausea or vomiting

The above numbered items are the signs and symptoms most frequently listed as those most constantly found in early, acute appendicitis and, when occurring in *proper sequence*, constitute a typical history.

- (a) Arrange the items numerically in proper sequence: .....  
 (b) As applied to all cases of typical, acute, early appendicitis: No. ....  
 is most constant.  
 (c) What determines the absence of, or location of, item No. 4?.....  
 (d) What determines the degree of item No. 1?.....  
 (e) What is the microscopic, *diagnostic* pathological finding in acute appendicitis? .....  
 (f) In a case of acute appendicitis (late) name the most significant single, objective sign diagnostic of appendiceal abscess:.....

This question (No. 5) is an excellent example to show how inclusive a single question may be, and in this instance is applied to the subject, acute appendicitis. It covers the symptomatology emphasizing: the frequency, constancy, and order of occurrence of the typical signs and symptoms; the relative significance of the anatomical location of the appendix as it affects the local signs; the factors influencing the amount of constitutional reaction. In addition, the complications as well as the microscopic pathology are touched upon.

It may be said that one might elicit the same information in essay form, but to do so and have it available for examining and grading would necessitate radical modification in the construction of the question, which is rarely if ever seen in the medical essay examination as used today. If such modification were made, the essay question would approach in type, the objective question suggested.

No. 6. Cholecystographic report reads: "Gallbladder not visualized." Assuming that dye was administered properly and X-ray technic was beyond criticism, account for failure to visualize in *three* ways: .....

This question (No. 6) calls for an understanding of the mechanism by which visualization of the gallbladder is accomplished. An appreciation of the sources of error in interpretation is also required. It is also obvious that the student must have basic knowledge in anatomy, physiology and pathology.

7. (a) Why, in acute pancreatitis, seen early, is muscle spasm of the abdominal wall a sign which is usually conspicuous by its absence? .....  
 (b) In doing a laparotomy for acute pancreatitis, upon incising the peritoneum, but before visualizing the pancreas, what objective finding is diagnostic of the disease? .....

In example question No. 7, part (a) was designed to elicit an appreciation of the relationship between the anatomical position of the pancreas and the early clinical picture (local signs) of this particular acute surgical lesion. The student must have knowl-

edge of both in order to correlate. Part (b) is an additional simple inquiry requiring some knowledge of the associated gross surgical pathology.

No. 8. You are examining the abdomen of a patient who has had acute severe abdominal pain of four hours duration. You believe there is obliteration of liver dullness on percussion.

- (a) Of what significance is such an observation? .....
- (b) How can such obliteration be definitely established visually? .....
- (c) If definitely established, is such a patient more apt to be male or female?

.....

- (d) Why? .....

In the design of this question (No. 8) it is expected that the student should attach considerable significance to a certain clinical observation when it is associated with a suggested acute surgical abdomen. The obliteration of liver dullness should suggest perforated peptic ulcer and it should be appreciated that in such cases subdiaphragmatic air is frequently demonstrable by X-ray. Further, he is expected to realize how much more frequently it occurs in the male as compared to the female. With this type of question considerable information may be elicited and a lot more than memory and guesswork is required on the part of the examinee.

No. 9. In the diagnosis of chronic gallbladder disease, number the following items in their order of importance:

- .....Local signs
- .....Cholecystography
- .....History
- .....Duodenal drainage

This short but significant question (No. 9) determines whether proper emphasis is placed on the value of the history in chronic gallbladder disease. The examiner pays no attention to any of the items other than history. If history is designated, as the most important, full credit is given.

No. 10. A widow, age 35 years, consults you in February, 1936, because of lumps in both breasts. Thirteen years before, in 1923, small tumors had been removed from both breasts by a surgeon. Her general health has been good and there is no pain in, discharge from, or retraction of, the nipples. There is a small mass in the upper, outer quadrant of the right breast which is freely movable and elastic. There is another mass in the lower outer quadrant of the left breast which is also movable and elastic.

Diagnosis: .....

Treatment: .....

This type of question is one of the best and is extremely valuable. The possibilities contained therein are almost unlimited. They are perhaps the most difficult ones to construct satisfactorily for a fine balance is required. Irrelevant items can and should be included but too much confusion must be avoided. Essential facts necessary to the diagnosis must be carefully and subtly incorporated in the picture as a whole—giving sufficient but not too much information for a diagnosis.

The student is obliged to interpret the history, identify and evaluate the important subjective and objective facts and, through correlation, arrive at the most logical conclusion. In the form of suggested treatment or advice requested, one is further able to check a student's understanding of the situation.

Time and space will not permit, nor should it be necessary to display more of, and analyze further, the questions. The possibilities of appraising a student's knowledge, general or specific, on any subject one may desire, should be obvious.

The examples shown happen to be surgical questions, but it is readily seen that similar ones can be designed or adapted to cover any phase or specialty in the field of medicine. It is obvious also that these particular questions, though for the most part clinical (which type of examination it was meant to be), require and demand a certain amount of fundamental knowledge in the basic sciences. Knowledge of these basic sciences may be tested to any degree in accordance with the desire of the individual designing the questions.

The questions may vary in length depending on the number of parts included to sample knowledge in the various relevant phases of the same subject. The whole question, as well as the individual multiple component parts of a question on a particular subject, can be weighted according to one's opinion as to its worth, and in this manner, superior knowledge can be sought for and tested without undue penalty, merely by weighting very low the question or part calling for same.

From the examples given it will be understood that questions, objective in type, require far more time and effort in their construction than the essay type and must be supplied in far greater number. This fact alone may, but should not, discourage anyone contemplating the trial of the objective type examination. A sufficient number of questions is easily obtainable with a little cooperation on the part of all of the instructors, best obtained, perhaps, through the heads of the departments. If secured in this manner several distinct advantages are realized.

- (1) A volume of satisfactory questions can be acquired easily and frequently without making excessive demands on a few unselfish individuals.
- (2) Proper selection of material from the logical source is assured.
- (3) All instructors become interested in the examination because of their participation therein, which is possible and desirable because of its comprehensiveness.
- (4) Because of its comprehensiveness the student must be better and more adequately prepared.
- (5) Because the testing or sampling of knowledge is extensive, teaching can be checked and the heads of the departments can keep in touch with, and more effectively appraise and influence the work of their departments.

Though this proposed plan for securing questions is the one which we have tried to follow, at the present time in this medical school it is modified to the

extent of relegating this important function, as well as others, to a smaller group of individuals known as the examination committee. The members, nine in number, are all sincere, energetic, younger members of the faculty, ever willing and unafraid to work for a common interest. I cannot adequately express my appreciation of their loyalty, cooperation and tireless efforts throughout the past five years and to them the credit is due for the accomplishment of our objective.

They were selected from the major departments and are responsible for the selection, construction, inclusion and grading of the questions pertaining to their department.

The questions, having been designed, are then submitted to the scrutiny of the committee. Desirability, based on validity and practicality, is determined, and they are tested further for the express purpose of insuring specificity of answer and eliminating ambiguity or trickiness. They are then modified as, and if necessary to be finally accepted, or are rejected. In acceptable form, they are again tested and timed and later balanced and assembled in final form to the satisfaction of the department committee representatives; they are then finally weighted.

| SENIOR COMPREHENSIVE EXAMINATION 1936 |                      |                  |              |                              |                  |
|---------------------------------------|----------------------|------------------|--------------|------------------------------|------------------|
| MAJOR<br>SUBJECTS<br><br>750          | SURGERY:<br><br>300  | General          | SPECIALTIES: | MINOR<br>SUBJECTS<br><br>250 | 80 Pediatrics    |
|                                       |                      | Orthopedic       |              |                              | 80 Urology       |
|                                       |                      | Anesthesia       |              |                              | 60 Dermatology   |
|                                       |                      | Neurosurgery     |              |                              | 10 Ophthalmology |
|                                       |                      | Thoracic Surgery |              |                              | 10 Rhinology     |
|                                       |                      | Radiology        |              |                              | 10 Otology       |
|                                       |                      | Proctology       |              |                              |                  |
|                                       | MEDICINE:<br><br>300 | Diagnosis        |              |                              |                  |
|                                       |                      | Therapeutics     |              |                              |                  |
|                                       |                      | Neurology        |              |                              |                  |
|                                       |                      | Psychiatry       |              |                              |                  |
|                                       |                      | Hygiene          |              |                              |                  |
|                                       |                      | OBS. & GYN.      |              |                              |                  |
|                                       | 150                  | Obstetrics &     |              |                              |                  |
|                                       |                      | Gynecology       |              |                              |                  |

Chart 1

THE COMPREHENSIVE EXAMINATION AS USED  
IN THE FINAL YEAR OF OUR SCHOOL

This examination in 1936 as given to the senior medical student comprised three parts.

PART I. A three hour written examination consisting of two essay questions, one from each of the departments of medicine and surgery.

This part was included primarily for the purpose of investigation and study, with particular reference to reliability of grading. The results have been reported to and published by the Congress on Medical Education and Licensure.<sup>14</sup>

14. Dobbie, R. P.: The Essay Examination "On the Spot," *Pro. Annual Congress on Medical Education and Licensure*, Chicago, 1937. p. 45.



PART II. A written comprehensive objective type examination given in two parts on successive days. The demonstration (in a general way) of this complete examination as was used in our school, and (in greater detail) the surgical part of it which was in like manner also used in several other schools, follows.

PART III. A ten minute oral examination of each student by an examining board comprised of six members.

The investigation and analysis of the results of this and other oral examinations will, I hope, be ready for publication in the near future.

| SENIOR COMPREHENSIVE EXAMINATION 1936            |               |          |         |         |
|--|---------------|----------|---------|---------|
| UNIVERSITY OF BUFFALO, SCHOOL OF MEDICINE        |               |          |         |         |
| CONSTRUCTION OF SPECIAL SURGERY EXAMINATION 1936 |               |          |         |         |
|  | PAGES         | SUBJECTS | ANSWERS | CREDITS |
| SURGERY:   | 15            | 76       | 200     | 300     |
| MEDICINE:  | 15            | 78       | 190     | 300     |
| OBS. & GYN.                                      | 6             | 31       | 125     | 150     |
| PEDIATRICS:                                      | 3             | 17       | 86      | 80      |
| UROLOGY:   | 2             | 13       | 34      | 80      |
| DERMATOLOGY:                                     | 2             | 13       | 55      | 60      |
| OPHTHALMOLOGY:                                   | 1             | 17       | 20      | 10      |
| RHINOLOGY:                                       | $\frac{1}{2}$ | 7        | 14      | 10      |
| OTOLOGY:   | $\frac{1}{2}$ | 5        | 6       | 10      |
| TOTAL:   | 45            | 257      | 730     | 1000    |

Chart 2

The examination referred to as PART II, and now to be demonstrated, was designed to cover in a comprehensive manner the work of all of the departments represented in the clinical years.

The three major departments, viz., medicine, surgery, and obstetrics and gynecology, with their allied specialties, utilized 75 per cent of the examination by volume and weight, 750 points or credits being distributed proportionately among the questions pertaining to these subjects. The remaining 25 per cent of the examination was made up of questions on six minor subjects, or specialties, 250 credits being distributed arbitrarily and proportionately among them. By referring to charts 1 and 2 one can see how this particular examination was constructed.

| 1936 SENIOR COMPREHENSIVE EXAMINATION INDEX |  |                   |
|---|--|-------------------|
| SUBJECT                                     | PAGES (INDIVIDUAL)                           | TOTAL PAGES       |
| SURGERY:                                    | 1-4-7-10-13-16-19-22<br>25-28-31-34-37-40-43 | (15)              |
| MEDICINE:                                   | 2-5-8-11-14-17-20<br>24-27-30-33-36-39-42-46 | (15)              |
| OBS. & GYN.                                 | 3-6-12<br>26-29-35                           | (6)               |
| PEDIATRICS:                                 | 9<br>32-45                                   | (3)               |
| UROLOGY:                                    | 21<br>41                                     | (2)               |
| DERMATOLOGY:                                | 15<br>38                                     | (2)               |
| OPHTHALMOLOGY:                              | 18   | (1)               |
| RHINOLOGY:                                  | $\frac{1}{2}$ of 44                          | ( $\frac{1}{2}$ ) |
| OTOLOGY:                                    | $\frac{1}{2}$ of 44                          | ( $\frac{1}{2}$ ) |
|   | <u>TOTAL PAGES</u>                           | (45)              |

Chart 3

Here, the departments and subjects or specialties are shown with their relative proportionate volume according to space utilized, answers required, and credit weight assigned. It will be observed that this particular examination was 45 pages (legal size) in length; comprising 730 questions relating to 257 subjects or phases of medicine and was given a total weight of 1000 credits.

In the printing and setting up of the examination questions for binding into individual student booklets, the questions covering the work of one department

are confined to the same page or pages. When assembled, these pages are alternated according to subject, as will be seen by the examination index shown in chart 3.

This irregular distribution of questions or subject pages throughout the entire examination has been found necessary to facilitate subsequent scoring and in determining the subject grade. It is also desirable because unfavorable factors such as, insufficient time, fatigue, subject preference, etc., exert their influence evenly on all subjects.

The examination, as a whole, seems also to be improved in that the student approaches with an open mind, and in a far more practical manner, an assorted subject material, just as he should his patients, with no expectation of having them grouped or classified as medical, surgical or gynecological.

In the front of each examination booklet, and just preceding the question pages, an instruction sheet is inserted. It is important in that it informs the student as to what is expected in the way of answers; emphasizes the need of careful reading and interpretation of the questions; and offers suggestions which should be helpful to its completion.

#### INSTRUCTION SHEET—1936

This examination was specially prepared by the examination committee for this senior class and is designed to cover the clinical subjects of the clinical years, viz., Junior and Senior years.

This examination differs markedly from those previously taken by you in the medical school, in two respects:

1. The examination is composed entirely of "objective test, short answer form" questions.
2. It is comprehensive, but only in that all of the clinical subjects of the Junior and Senior years are included in one examination.

This folder is the *first half* of a *two part examination*. You are to complete this half of the examination this morning and return for the second half tomorrow morning.

The examination at first sight may appear to be long, but it has been found that an individual who has adequate knowledge of the various subjects here represented, can complete it in a surprisingly short space of time.

Much time and care has been spent in the designing of each question in order to eliminate ambiguity and to assure specificity of answer. It is to be noted that this type of question requires *careful thought* with a minimum amount of writing and for that reason it is essential that you *read questions carefully before answering*.

Correct interpretation of the questions is part of this examination, therefore, no help from any attendant is to be expected or given. Ample space has been provided for the answer desired and *only this space* is to be utilized. *See* that the small amount of *writing* required of you is *legible*. Do not write explanations, amplifications or com-

ments of any kind in the margins or anywhere, except in the space provided for specific answer. If you feel that more than one answer would be acceptable, give the *one answer* which you select as the most appropriate one.

It is suggested that you temporarily omit those questions which you may find difficult, carefully checking them in passing so that you may return to them at leisure, when the remainder of the questions have been answered.

It is fair to assume that because of the volume of questions the weight of each individual answer is relatively small, but it does not necessarily follow that such weight varies directly with the length of question or answer.

You are to record the time required for completion on the Questionnaire sheet in the back. This sheet is part of the examination and must be filled in.

You are not to write on the folder, but in the back there are three blank sheets which may be used, if desired, as scrap paper. *No sheet is to be removed from the folder, however.*

**READ QUESTIONS CAREFULLY!**

Immediately following the last question page, a questionnaire sheet is inserted and is considered as part of the examination though no credit is given nor is a penalty imposed for the answers. This sheet also is quite important for, when completed and analyzed, it gives the committee considerable interesting and useful information. It is almost invariably completed quite frankly by the student and has contributed much in our attempts to improve each successive examination. The questions may, of course, be varied at will, both in number and nature depending on the information desired. A copy of the one we use follows.

## QUESTIONNAIRE

THIS SHEET IS PART OF THE EXAMINATION AND MUST BE ANSWERED.

- [illegible]

In addition to these instruction and questionnaire sheets, two or three blank ones are included in the binding. They may be but are rarely used by the student and may not be removed from the folder.

The student's identification number is then stamped on every sheet of his or her booklet and the examination is ready to present for writing.

This examination as described was designed as an eight hour examination. It actually required between 6 hours 55 minutes and 9 hours (limit) to complete. The average time was 8 hours and 28 minutes. It is longer than necessary and I have no doubt that the same information could be obtained with an examination considerably shorter which would spare both student and examiner much time and effort.

When the student has finished writing the examination, the booklets are returned intact to the committee. They are then disassembled and the pages rearranged so that those containing the same questions are put together in consecutive order according to the respective identifying student numbers. For instance, all of the pages containing surgical questions are placed in one book which contains as many copies of each page as there were booklets or students writing the examination. In other words, if one hundred students participated, page 1 of each of the one hundred students are placed together and graded according to the control answered and weighted corresponding page. Page 2 of each student, having been likewise assembled, is next graded and so on until all of the pages have been scored.

In the process of grading, the credits allowed for the given answer to each question are inserted in the marginal vertical column provided on each examination page and totaled at the foot of the page. These page totals are then placed on a master sheet opposite the student's name or identification number, the grand total of which represents the credits and percentage grade obtained on the entire examination.

As the examination pages are segregated according to subject or department origin, it is possible to obtain readily the percentage grade earned in each department as well as the comprehensive grade.

This method of page arrangement for grading may seem complicated but it is, in reality, quite simple. It is not only necessary but has many advantages. It is necessary because the volume of questions and the extreme variation in weights make it impossible for an examiner to carry in his mind the credit worth of each part of each question contained on more than one page at a time. The advantages pertain to convenience, speed and reliability in grading. Such factors as illegible writing and poor diction, which are foreign to the purpose of the examination, are minimized and not penalized because any such defects characterizing the same student are encountered only when his page is under scrutiny and at infrequent intervals. Another advantage is that it is impossible for any examiner to determine the grade of any student until the grading of the entire examination has been completed, and the master sheet with totals has been prepared.

From the master sheet referred to, a study and analysis of each student's performance is possible and may be as extensive as one wishes to make it. It has been our custom to determine and isolate the percentage grade obtained by each student in each of the nine subjects. In this way the subject weakness of those students whose performance has been unsatisfactory or below average can be located. This can be graphically portrayed by constructing a chart which divides the class into fifths and then placing in the proper fifth each student (identified by number) according to the subject percentage grade obtained.

As to be expected, there is shown a definite correlation between the grades of the same student in all of the various subjects or departments. In chart 4 it is readily observed, by comparing the location of identification numbers, that a student doing well in the entire examination, as manifested by a relatively high comprehensive grade will, with rare exception, do correspondingly well in each and all of the major subjects and vice versa.

| COMPREHENSIVE EXAMINATION 1936                             |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |
|--|-----------|----|----|----|----|-----------|----|----|----|----|-----------|----|----|----|----|-----------|----|----|----|----|-----------|----|----|----|----|
| GROUP ARRANGEMENT OF STUDENTS ACCORDING TO GRADES OBTAINED |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |
|  | 1st FIFTH |    |    |    |    | 2nd FIFTH |    |    |    |    | 3rd FIFTH |    |    |    |    | 4th FIFTH |    |    |    |    | 5th FIFTH |    |    |    |    |
| COMPREHENSIVE<br>EXAMINATION<br>1000                       | 47        | 36 | 28 | 62 | 60 | 51        | 23 | 54 | 53 | 4  | 12        | 1  | 46 | 26 | 27 | 29        | 50 | 48 | 7  | 34 | 39        | 16 | 8  | 49 | 20 |
|  | 21        | 14 | 37 | 63 | 2  | 40        | 3  | 33 | 42 | 57 | 17        | 10 | 8  | 25 | 6  | 43        | 45 | 56 | 11 | 38 | 13        | 9  | 15 | 58 | 52 |
|  | 24        |    |    |    |    | 54        | 55 | 64 | 18 | 32 | 22        | 30 |    |    |    | 41        | 31 |    |    |    |           |    |    |    |    |
|  |           |    |    |    |    | 35        | 44 | 19 | 61 |    |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |
| SURGERY<br>300   | 47        | 14 | 63 | 28 | 36 | 12        | 21 | 23 | 53 | 2  | 33        | 37 | 51 | 3  | 56 | 22        | 7  | 48 | 34 | 19 | 41        | 13 | 49 | 5  | 39 |
|  | 27        | 55 | 24 | 62 |    | 35        | 40 | 42 | 60 | 57 | 32        | 28 | 64 | 61 | 46 | 8         | 31 | 60 | 11 | 30 | 38        | 20 | 16 | 58 | 52 |
|  |           |    |    |    |    | 4         | 54 | 18 | 44 | 59 | 6         | 10 | 17 | 1  | 29 | 43        | 15 | 45 | 25 | 9  |           |    |    |    |    |
|  |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |           |    |    |    |    |
| MEDICINE<br>300  | 37        | 51 | 36 | 60 | 18 | 57        | 53 | 44 | 23 | 46 | 7         | 12 | 54 | 59 | 6  | 26        | 39 | 64 | 32 | 20 | 31        | 43 | 16 | 61 | 22 |
|  | 47        | 24 | 62 | 2  | 21 | 14        | 4  | 42 | 1  | 3  | 8         | 50 | 38 | 33 | 40 | 34        | 48 | 5  | 10 | 29 | 27        | 58 | 15 | 49 | 56 |
|  | 28        |    |    |    |    | 55        | 63 |    |    |    | 41        | 17 | 19 | 11 | 50 | 9         | 13 |    |    | 52 |           |    |    |    |    |
|  |           |    |    |    |    |           |    |    |    |    | 45        | 35 | 25 |    |    |           |    |    |    |    |           |    |    |    |    |
| ORG. & GYN.<br>150   | 47        | 2  | 33 | 63 | 22 | 23        | 4  | 21 | 24 | 59 | 35        | 10 | 14 | 18 | 3  | 1         | 31 | 13 | 43 | 7  | 11        | 20 | 39 | 49 | 45 |
|  | 19        | 40 | 60 | 64 | 62 | 61        | 55 | 8  | 26 | 27 | 51        | 17 | 25 | 37 | 53 | 12        | 29 | 42 | 54 | 34 | 5         | 58 | 6  | 15 | 52 |
|  |           |    |    |    |    | 28        | 30 | 36 | 48 |    | 50        | 32 | 38 | 67 | 44 | 41        | 16 | 45 |    |    |           |    |    |    |    |
|  |           |    |    |    |    |           |    |    |    |    | 56        | 9  |    |    |    |           |    |    |    |    |           |    |    |    |    |

THE NUMBERS DISPLAYED IN EACH FIFTH ARE THE STUDENT IDENTIFICATION NUMBERS

Chart 4

Each department examiner can, if he desires, further analyze his own examination, finding out the prevailing weaknesses of the students by referring to the examination pages which were, in general, answered poorly, and determine thereby whether the question, teaching or student is defective.

Actually, this so-called comprehensive examination, with its numerous, evident advantages, is no more than a collective group of well constructed and well balanced department examinations. It effectively replaces, with great and welcome relief to the student, the numerous departmental examinations customarily administered over many successive days, at the same time augmenting rather than sacrificing or compromising the interests and objectives of the respective departments. This contention can be ably supported by further demonstration in greater detail, of any one of the included major departmental examinations.



### III.—A COMPREHENSIVE OBJECTIVE TYPE EXAMINATION IN SURGERY.

An examination within an examination. Content analysis in detail.

The comparative analysis of the results obtained in four participating schools.

It must be remembered that the word "comprehensive" is a relative term and when applied to an examination or one of its component parts refers primarily and in a comparative manner to its extensiveness. It is evident then, that one question or examination may be more or less comprehensive than another.

This part of the more comprehensive examination just described is, as will be shown, a complete and comprehensive examination in itself. It has been chosen for detailed consideration and analysis in order to further show the inherent possibilities of the objective type question. Surgery has deliberately been singled out for several specific reasons. It is my special field and is the only part of the complete examination for which I alone am responsible. It naturally follows, therefore, that I am better able to discuss this part and because of greater familiarity with the surgical curriculum, am better able to describe and justify what is considered to be a well designed and proportioned examination. In the preceding demonstration and discussion pertaining to question design and construction, examples of surgical questions were used for these same reasons. Also, the examination given to the several outside schools was this surgery part of the more comprehensive examination described, and in order to appreciate the results obtained in the participating schools, some knowledge of the examination upon which the analysis is based is necessary.

#### SPECIAL SURGERY EXAMINATION

Though it was used in our school as part of the comprehensive written examination previously outlined, and comprised 30 per cent of its total weight; to avoid confusion, it will hereafter be referred to as the Special Surgery Examination because it is, from now on, to be considered for use as an individual, complete departmental examination, comprehensive only as it applies to the particular subject of surgery.

This examination was designed to test or sample broadly, adequately and fairly, the knowledge and extent of understanding acquired by the senior medical student in the field of clinical surgery.

It consisted of a booklet containing fifteen legal size pages on which were printed about two hundred questions relating to about seventy-six different surgical subjects. Ample space was carefully planned and provided immediately following each question for the required two hundred specific answers. The total weight or credit worth was three hundred.

In the selection of subjects, design of questions, and distribution of weight, every effort was made to produce a well balanced, properly proportioned examination. Though for the most part clinical in nature, questions pertaining to related basic sciences and preclinical studies were included where and whenever they seemed advisable or desirable.

For the purpose of analysis, the subject content of this examination has been divided into five parts, as follows:

|  | CREDITS     |
|--|-------------|
| A—Surgical Diagnosis (including seventeen case histories).....       | 89          |
| B—Surgical Pathology (touching upon gross diagnostic phases).....    | 62          |
| C—Applied Surgical Anatomy (as affecting diagnosis).....             | 38          |
| D—Clinical Signs and Symptoms.....                                   | 36          |
| Diagnosis .....  | 225 or 75%  |
| E—Judgment, Prognosis, Treatment (questions pertaining thereto)..... | 75 or 25%   |
| Total Examination Credits.....                                       | 300 or 100% |

This arbitrary grouping is made in an attempt to portray and emphasize according to their relative importance, the basic fundamentals in surgery around which the examination was constructed. You will observe that four of the five subjects pertain to diagnosis, and that 75 per cent of the total examination weight has been assigned thereto. The remaining 25 per cent of weight has been distributed amongst questions requiring answers relative to judgment in prognosis and treatment. Too much weight may appear to have been assigned to one or the other, but in our examination it seemed to be the logical and proper distribution.

As will be appreciated, the classifying and indexing of the entire subject material incorporated in the examination is a considerable task for both author and reader but it is necessary in order to fully comprehend the character, extent and diversification of the great number of surgical problems made available for sampling knowledge. It will be seen that effort has been made to include the more common, rather than the infrequent lesions and that item credit weight, though variable, is in most instances small.

In the indices immediately following, each item with apportioned weight represents the surgical phase touched upon and for which a question was designed and included in the examination.

| A—SURGICAL DIAGNOSIS: (17 clinical cases)             | CREDITS |
|---|---------|
| Malignancy of the thyroid gland.....                  | 5       |
| Postoperative sequelle, clinical aspects.....         | 4       |
| Felon in a diabetic.....                              | 4       |
| Marginal or gastrojejunal ulcer.....                  | 5       |
| Middle meningeal hemorrhage syndrome.....             | 3       |
| Postoperative biliary duct stricture.....             | 5       |
| Congenital hydrocele .....                            | 4       |
| Bilateral cysts breast (chronic cystic mastitis)..... | 4       |
| Right colon malignancy.....                           | 2       |
| Branchial cyst and fistula .....                      | 4       |
| Derangement internal semilunar cartilage.....         | 3       |
| Acute perforated peptic ulcer (seen early).....       | 4       |
| Severe concealed hemorrhage (lacerated spleen).....   | 2       |
| Rupture tendon Achilles .....                         | 3       |
| Benign bone tumor (femur).....                        | 2       |
| Peritonitis and hemorrhage .....                      | 6       |
| Carcinoma of the male breast.....                     | 2       |

## MISCELLANEOUS DIAGNOSTIC PROBLEMS

|  |   |
|--|---|
| Perforated ulcer, liver dullness, sex.....         | 6 |
| Stages of anesthesia.....                          | 4 |
| Specific preoperative diagnosis.....               | 6 |
| Fracture and dislocation femur.....                | 5 |
| Importance of history in gall bladder disease..... | 2 |
| Incidence of disease—age and sex.....              | 4 |

Total Credits ..... 89

## B—SURGICAL PATHOLOGY:

## CREDITS

|  |   |
|--|---|
| Fat necrosis intraperitoneal.....                                | 2 |
| Bloody peritoneal fluid found in the acute surgical abdomen..... | 3 |
| Postoperative complications, (pathological basis).....           | 4 |
| Microscopic diagnostic findings in acute appendicitis.....       | 2 |
| Peri-appendicitis; Salpingitis.....                              | 2 |
| Hemorrhage from adnexa.....                                      | 2 |
| Coccus peritonitis.....  | 3 |
| Perforated peptic ulcer.....                                     | 3 |
| Traumatic intra-abdominal hemorrhage and peritonitis.....        | 3 |
| Lung abscess.....  | 2 |
| Empyema.....   | 2 |
| Causes for the failure of the gall bladder to visualize.....     | 3 |
| Middle meningeal hemorrhage.....                                 | 6 |
| Hydrops of the gall bladder.....                                 | 4 |
| Specific surgical pathological lesions.....                      | 8 |
| Complications of peptic ulcer.....                               | 2 |
| Pathology requiring specific surgical procedures.....            | 7 |
| Causes of biliary fistula.....                                   | 2 |
| Infected wound.....  | 2 |

Total Credits ..... 62

## C—SURGICAL ANATOMY:

## CREDITS

|  |   |
|--|---|
| Cranial nerves.....                                  | 2 |
| Pancreas retroperitoneal.....                        | 2 |
| Elbow joint injuries—relations—bones and nerves..... | 4 |
| Fracture radius.....                                 | 5 |
| Function hand (splinting).....                       | 4 |
| Facial nerve (parotid tumor).....                    | 2 |
| Inguinal hernia.....                                 | 7 |
| Position of appendix.....                            | 2 |
| Infection of hand.....                               | 2 |
| Complications of fractures.....                      | 5 |
| Facial palsy (differential).....                     | 3 |

Total Credits ..... 38

## D—CLINICAL SIGNS AND SYMPTOMS AND DISEASES:

## CREDITS

|   |   |
|---|---|
| Excruciating abdominal pain.....                          | 3 |
| Temperature in acute surgical diseases.....               | 1 |
| Fracture of the head of the radius.....                   | 2 |
| Leading signs of concealed hemorrhage.....                | 4 |
| Signs and symptoms of common duct stone.....              | 3 |
| Rectal diseases causing diarrhea.....                     | 3 |
| Signs of carcinoma of the rectum.....                     | 2 |
| Congenital anomalies.....                                 | 3 |
| Fracture of the skull (signs positive).....               | 2 |
| Factors determining rate of recovery from anesthesia..... | 3 |
| Graves' disease signs.....                                | 1 |
| Hyperthyroidism.....                                      | 2 |
| Hyperparathyroidism.....                                  | 2 |
| Crepitus.....   | 3 |
| Differential gall bladder disease.....                    | 2 |

Total Credits ..... 36

## E—JUDGMENT, TREATMENT AND PROGNOSIS:

|   | CREDITS |
|---|---------|
| Treatment of Raynaud's disease.....                       | 2       |
| Jaundice and prognosis.....                               | 2       |
| Prognosis in pulmonary embolism.....                      | 1       |
| Prognosis in perforated peptic ulcer.....                 | 2       |
| Treatment of incomplete fracture head radius.....         | 1       |
| Judgment in splinting poliomyelitis.....                  | 2       |
| Judgment and treatment unilateral T. B. cavity.....       | 2       |
| Treatment of felon (early specific case).....             | 1       |
| Treatment of middle meningeal hemorrhage.....             | 2       |
| Judgment in, and treatment of, empyema.....               | 2       |
| Treatment postoperative biliary duct stricture.....       | 2       |
| Treatment bilateral chronic cystic mastitis.....          | 2       |
| Right colon malignancy—judgment, advice.....              | 3       |
| Treatment of fracture of the skull.....                   | 2       |
| Embryology. Hare lip.....                                 | 2       |
| Relation of size to prognosis in breast tumor.....        | 1       |
| Branchial fistula treatment.....                          | 1       |
| Prognosis in intestinal obstruction and peptic ulcer..... | 4       |
| Anesthesia.....   | 7       |
| Judgment in diagnosis and treatment of appendicitis.....  | 6       |
| Judgment in deranged semilunar cartilage.....             | 2       |
| Prognosis as for function in extremities.....             | 7       |
| Treatment in early, acute, perforated peptic ulcer.....   | 1       |
| Prognosis carcinoma breast.....                           | 2       |
| Empyema, judgment.....                                    | 2       |
| Judgment and treatment severe concealed hemorrhage.....   | 8       |
| Treatment rupture tendon Achilles.....                    | 1       |
| Prognosis bone tumor.....                                 | 3       |
| Judgment tumor male breast.....                           | 3       |
| Total Credits.....  | 75      |

One is likely to get the impression that too much preference has been given to one subject or another, or that one region or specialty has been wrongly given too much or too little emphasis. This is quite probable in view of the fact that a marked variation in opinion is to be expected. A critical survey covering this phase is made possible in chart 5 which shows the emphasis placed and the relative weight allocated according to regional and special distribution.

|  |                                      | Questions | Credits | % of Examination |
|--|--------------------------------------|-----------|---------|------------------|
| GENERAL SURGERY<br>237 TOTAL CREDITS<br>79 PER CENT        | Head and Face.....                   | 6         | 21      |                  |
|  | Neck.....                            | 6         | 17      |                  |
|  | Breast.....                          | 4         | 14      |                  |
|  | Extremities.....                     | 4         | 13      |                  |
|  | Fractures.....                       | 4         | 22      |                  |
|  | Abdominal (15 subjects).....         | 45        | 150     |                  |
|  | General Surgery Total.....           |           | 237     | 79%              |
| SURGICAL<br>SPECIALTIES<br>63 TOTAL CREDITS<br>21 PER CENT | Orthopedic Surgery.....              | 4         | 18      |                  |
|  | Anesthesia.....                      | 3         | 14      |                  |
|  | Thoracic Surgery.....                | 5         | 10      |                  |
|  | Neuro Surgery.....                   | 3         | 7       |                  |
|  | Radiology.....                       | 4         | 9       |                  |
|  | Proctology.....                      | 2         | 5       |                  |
|  | Specialties Total.....               |           | 63      | 21%              |
|  | Grand Total Examination Credits..... |           | 300     | 100%             |

Chart 5

To show further the inclusiveness of the examination and for the particular benefit of those who may be interested in one or more of the regions or specialties, the analysis is continued along this line.

| GENERAL SURGERY                               |    |         |
|---|----|---------|
| HEAD AND FACE:                                |    | CREDITS |
| Middle meningeal hemorrhage.....              | 11 |         |
| Epulis .....                                  | 2  |         |
| Tumor parotid gland .....                     | 2  |         |
| Fracture skull .....                          | 2  |         |
| Cleft palate .....                            | 2  |         |
| Fracture skull .....                          | 2  |         |
|   |    | 21      |
| NECK:   |    |         |
| Thyroid .....                                 | 5  |         |
| Hygroma .....                                 | 2  |         |
| Branchial cyst and fistula .....              | 5  |         |
| Graves' disease .....                         | 1  |         |
| Graves' disease .....                         | 2  |         |
| Hyperparathyroidism .....                     | 2  |         |
|   |    | 17      |
| BREAST:                                       |    |         |
| Chronic cystic mastitis .....                 | 6  |         |
| Carcinoma breast .....                        | 1  |         |
| Carcinoma breast .....                        | 2  |         |
| Carcinoma male breast .....                   | 5  |         |
|   |    | 14      |
| EXTREMITIES:                                  |    |         |
| Splinting wrist .....                         | 4  |         |
| Felon .....                                   | 5  |         |
| Tenosynovitis .....                           | 2  |         |
| Infected hand .....                           | 2  |         |
|   |    | 13      |
| FRACTURES:                                    |    |         |
| Fracture and dislocation elbow.....           | 4  |         |
| Fracture of radius.....                       | 8  |         |
| Fracture and dislocation femur.....           | 5  |         |
| Complications fractures and dislocations..... | 5  |         |
|   |    | 22      |
| Total Credits .....                           |    | 87      |

| ABDOMINAL SURGERY                    |           |         |
|--------------------------------------|-----------|---------|
| SUBJECTS:                            | QUESTIONS | CREDITS |
| Miscellaneous .....                  | 7         | 19      |
| Peptic ulcer .....                   | 6         | 21      |
| Biliary tract disease.....           | 9         | 19      |
| Postoperative complications .....    | 4         | 18      |
| Trauma and concealed hemorrhage..... | 3         | 17      |
| Hydrocele and hernia .....           | 2         | 11      |
| Appendicitis .....                   | 3         | 10      |
| Peritonitis .....                    | 2         | 9       |
| Acute surgical abdomen.....          | 1         | 6       |
| Carcinoma colon .....                | 1         | 4       |
| Pelvis .....                         | 2         | 4       |
| Congenital lesions .....             | 1         | 3       |
| Perforation .....                    | 1         | 3       |
| Intestinal obstruction.....          | 1         | 2       |
| Perforating wounds .....             | 2         | 4       |
| Total .....                          | 45        | 150     |

From the above index it is apparent that by volume and weight, questions pertaining to abdominal surgery make up a sizeable proportion (50%) of the whole examination. Forty-five questions on about fifteen subjects as listed, were included.

Attention should be called to a weakness displayed in this particular examination in that no questions on urology or gynecology were included. An adequate comprehensive surgical examination would not fail to include them. This omission was not due to oversight, however, and is readily explainable as well as excusable for, as originally planned, this special surgical examination was a component part of a more comprehensive one in which the subjects under discussion were included in a comprehensive manner elsewhere.

Questions relating to the region of the abdomen rightly dominate any general surgical examination and because of this prominence, further detail is given showing the various phases covered.

| GENERAL SURGERY<br>QUESTIONS RELATING TO REGION OF ABDOMEN |     | CREDITS |
|--|-----|---------|
| Pancreatitis .....   | 2   | 2       |
| Fat necrosis .....   | 2   | 2       |
| Jaundice .....   | 2   | 2       |
| Postoperative complications .....                          | 5   | 5       |
| Perforated peptic ulcer.....                               | 2   | 2       |
| Acute pain .....   | 3   | 3       |
| Temperature .....  | 1   | 1       |
| Acute abdomen .....  | 3   | 3       |
| Postoperative complications .....                          | 4   | 4       |
| Appendicitis .....   | 2   | 2       |
| Pelvis .....   | 2   | 2       |
| Pelvis .....   | 2   | 2       |
| Peritonitis .....  | 3   | 3       |
| Perforation .....  | 3   | 3       |
| Concealed traumatic hemorrhage.....                        | 3   | 3       |
| Concealed hemorrhage .....                                 | 4   | 4       |
| Perforated peptic ulcer .....                              | 5   | 5       |
| Marginal ulcer .....                                       | 5   | 5       |
| Postoperative complications .....                          | 7   | 7       |
| Acute surgical abdomen .....                               | 6   | 6       |
| Gall bladder disease .....                                 | 4   | 4       |
| Common duct stone .....                                    | 3   | 3       |
| Desmoid .....  | 2   | 2       |
| Congenital hydrocele.....                                  | 4   | 4       |
| Inguinal hernia .....                                      | 7   | 7       |
| Acute appendicitis .....                                   | 2   | 2       |
| Peptic ulcer .....   | 2   | 2       |
| Carcinoma caecum .....                                     | 4   | 4       |
| Peptic ulcer and intestinal obstruction.....               | 4   | 4       |
| Acute appendicitis .....                                   | 6   | 6       |
| Miscellaneous .....  | 7   | 7       |
| Miscellaneous congenital lesions.....                      | 3   | 3       |
| Acute perforated peptic ulcer.....                         | 5   | 5       |
| Gall bladder disease.....                                  | 2   | 2       |
| Postoperative complications .....                          | 2   | 2       |
| Traumatic spleen internal hemorrhage.....                  | 7   | 7       |
| Gall bladder disease.....                                  | 2   | 2       |
| Peritonitis .....  | 6   | 6       |
| Age and sex incidence in disease.....                      | 4   | 4       |
| Crepitus .....   | 3   | 3       |
| Gall bladder disease .....                                 | 2   | 2       |
| Miscellaneous .....  | 3   | 3       |
| Total Credits .....  | 150 | 150     |



| SPECIALTIES                              |   | CREDITS |
|--|---|---------|
| ORTHOPEDIC SURGERY:                      |   |         |
| Splinting poliomyelitis .....            | 2 |         |
| Deranged semilunar cartilage .....       | 5 |         |
| Prognosis as for function .....          | 7 |         |
| Rupture tendon Achilles .....            | 4 |         |
|  |   | 18      |
| ANESTHESIA:                              |   |         |
| Stages anesthesia .....                  | 4 |         |
| Types of anesthesia .....                | 7 |         |
| Rate of recovery from anesthesia .....   | 3 |         |
|  |   | 14      |
| THORACIC SURGERY:                        |   |         |
| Pulmonary tuberculosis .....             | 2 |         |
| Lung abscess .....                       | 2 |         |
| Empyema .....                            | 2 |         |
| Empyema .....                            | 2 |         |
| Empyema .....                            | 2 |         |
|  |   | 10      |
| RADIOLOGY:                               |   |         |
| Subdiaphragmatic air .....               | 1 |         |
| Cholecystographic study .....            | 3 |         |
| Carcinoma caecum .....                   | 1 |         |
| Bone tumor .....                         | 4 |         |
|  |   | 9       |
| NEURO SURGERY:                           |   |         |
| Cranial nerves .....                     | 2 |         |
| Raynaud's disease .....                  | 2 |         |
| Differential facial palsy .....          | 3 |         |
|  |   | 7       |
| PROCTOLOGY:                              |   |         |
| Diarrhea and rectal disease .....        | 3 |         |
| Carcinoma of the rectum .....            | 2 |         |
|  |   | 5       |
| Total credits allotted specialties ..... |   | 63      |

From this exhaustive content analysis, one must surely be impressed with the comprehensiveness of the examination. From this standpoint alone, when compared with the usual essay examination composed of not more than from five to ten questions relating to as few subjects, it is certainly more adequate and it follows that it is fairer, for the large volume of questions gives the student a better chance to display his knowledge and therefore leaves less to chance.

It is in no way assumed that this examination is perfect and it is not expected that everyone should be in complete agreement over the contents. Improvement is obtained in each successive examination constructed. Whether too much or too little emphasis has been placed here or there, is a matter of personal opinion and unimportant, for the flexibility in design and composition makes it easily adjustable to any curriculum and to the complete satisfaction of any department group.

Up to the present time and during the past four years we have composed, administered, graded and analyzed seven different comprehensive objective type examinations. These have been used in our school exclusively. Four of them have been given to successive senior classes, 1934, 1935, 1936 and 1937, two to successive junior classes, 1936 and 1937, and one to a sophomore class, 1935 (preclinical subjects). In addition to the study in our school, the special surgery examination described, was used as designed by us in three other schools last year.

Gratified with the results obtained in the use of the objective type examination in our school, it seemed expedient to try it in other schools. It was thought that it would be most interesting and instructive to observe what a group of outside schools would do with the same examination and it offered the opportunity to check and verify the validity and reliability claimed for it. In addition, it was felt that suggestions or constructive criticism from outside sources would be conducive to improvement in the construction of future examinations. Much has been written on outside examinations and examiners and the privilege of playing in the rôle of outside examiner was also appealing.

The cooperation of the heads of the departments of surgery in three excellent, fairly large, widely separated schools was readily obtained, and it is only fitting that I should here express my gratitude to the students in general and the professors of surgery in particular, of all of the schools who so generously helped and through whom this study was made possible.

The examinations furnished all outside schools were identical with that given in our school except that in our instance it was not an isolated examination but was, as previously demonstrated, included as part of a larger, more comprehensive one.

Individual student examination booklets, having been prepared and properly identified, were sent in completed form to the respective schools where in turn they were, at the prearranged time, presented to the student.

On completion, all booklets were returned to me for examination and grading. This furnished the basis for a comparative study and analysis of the results obtained in all participating schools.

In three of the schools, our own included, this examination was used as, or substituted for, the usual final written department examination; (schools designated as A, B and D). In the fourth school, because of the fact that no written department examination was customarily given, it was used with the acquired voluntary consent of the student body and with the understanding that it should have no significance and carry no weight in their final department grade (school C). It seemed worthwhile including this school with the conditions imposed, to see in the comparative analysis what influence, if any, primary incentive may have.

Though it is true that this type of examination can be and has been reliably graded repeatedly and consistently with surprisingly little demonstrable variation in the grades assigned by different examiners, it was thought that the statistical reliability of any comparative analysis would be enhanced if the same examiner scored all of the booklets from all of the schools. To do this required a tremendous amount of time and effort; 346 examination booklets comprising fifteen legal sized pages (5,190) of short answer questions (69,200 answers) to be evaluated. This task, though formidable, was accomplished. The analysis follows.

| SPECIAL SURGERY EXAMINATION 1936 MASTER SHEET |                |                  |   |    |    |   |    |    |    |    |    |    |    |    |    |    |    |   |  |  |  |  |  |  |
|---|----------------|------------------|---|----|----|---|----|----|----|----|----|----|----|----|----|----|----|---|--|--|--|--|--|--|
| UNIVERSITY OF BUFFALO                         |                |                  |   |    |    |   |    |    |    |    |    |    |    |    |    |    |    |   |  |  |  |  |  |  |
| COMPREHENSIVE EXAMINATION                     |                |                  |   |    |    |   |    |    |    |    |    |    |    |    |    |    |    |   |  |  |  |  |  |  |
| TOTAL CREDIT WEIGHT - 300                     |                |                  |   |    |    |   |    |    |    |    |    |    |    |    |    |    |    |   |  |  |  |  |  |  |
| STUDENT<br>NUMBER                             | FINAL<br>GRADE | TOTAL<br>CREDITS | INDIVIDUAL PAGE NUMBERS 1 to 15 INCLUSIVE |    |    |   |    |    |    |    |    |    |    |    |    |    |    |   |  |  |  |  |  |  |
|   |                |                  | 1   | 2  | 3  | 4                                       | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | NUMBER OF CREDITS OBTAINABLE ON EACH PAGE |  |  |  |  |  |  |
|   |                |                  | 15  | 15 | 19 | 23                                      | 17 | 23 | 28 | 26 | 15 | 24 | 24 | 15 | 19 | 17 | 20 |   |  |  |  |  |  |  |
|   |                |                  |   |    |    | NUMBER OF CREDITS OBTAINED ON EACH PAGE |    |    |    |    |    |    |    |    |    |    |    |   |  |  |  |  |  |  |
| 1   | .67            | 202              | 11  | 13 | 12 | 12                                      | 12 | 19 | 16 | 17 | 12 | 22 | 17 | 5  | 13 | 11 | 10 |   |  |  |  |  |  |  |
| 2   | .75            | 225              | 13  | 14 | 12 | 18                                      | 12 | 21 | 18 | 23 | 13 | 18 | 20 | 11 | 8  | 8  | 16 |   |  |  |  |  |  |  |
| 3   | .72            | 216              | 14  | 12 | 8  | 13                                      | 16 | 22 | 14 | 15 | 12 | 22 | 15 | 15 | 10 | 13 | 15 |   |  |  |  |  |  |  |
| 4   | .73            | 220              | 13  | 15 | 8  | 16                                      | 17 | 23 | 17 | 15 | 10 | 19 | 14 | 14 | 11 | 12 | 16 |   |  |  |  |  |  |  |
| 5   | .61            | 183              | 6   | 13 | 9  | 11                                      | 9  | 16 | 14 | 12 | 13 | 18 | 17 | 9  | 12 | 10 | 14 |   |  |  |  |  |  |  |
| 6   | .69            | 206              | 9   | 13 | 10 | 15                                      | 13 | 17 | 15 | 14 | 14 | 22 | 15 | 12 | 6  | 14 | 17 |   |  |  |  |  |  |  |
| 7   | .66            | 198              | 7   | 13 | 9  | 11                                      | 11 | 16 | 16 | 19 | 12 | 19 | 18 | 7  | 12 | 12 | 16 |   |  |  |  |  |  |  |
| 8   | .64            | 191              | 4   | 13 | 11 | 15                                      | 12 | 16 | 16 | 15 | 12 | 20 | 13 | 7  | 11 | 12 | 14 |   |  |  |  |  |  |  |

Chart 6

A section of the master sheet upon which the comparative analysis is based, is shown in chart 6. Such a sheet is prepared for each school after scoring has been completed. It will be seen that the performances of each student can be readily estimated in part according to page, or in the whole examination. In this way individual weakness can be localized. The total weight being 300, the final comprehensive percentage grade is determined by dividing the total credits obtained by three.

Throughout this analysis the participating schools will be designated as A, B C and D for identification purposes only. They were assigned their letter in the order in which they were examined and graded.

The passing grade or level which is made and changed arbitrarily requires some explanation in order to eliminate confusion. Any examination as comprehensive as that described and used in this study, because of the specific answers demanded, and obtained in such a way that their evaluation becomes accurate

and reliable, will logically be more difficult than the essay examination to which we have so long been accustomed. This increased severity is evident and reflected in the uniformly lower grades invariably obtained in the well constructed objective type examination. Adjustment is therefore necessary, which can readily be accomplished by lowering the level of the passing grade. How much to lower it and where to place it has been our most difficult problem.

For a long time the passing or failing grade as applied to examinations has definitely been predetermined and placed at varying levels in different schools; ranging somewhere between 50 per cent and 75 per cent. How and why, I have never been able to understand. In our and many other schools a student must obtain 75 per cent in any and all examinations, to pass. This was determined and set up as an inviolable rule many years ago and is in fact incorporated each year in the school catalog. Surely, examinations should and do vary tremendously in degree of difficulty and why should not the passing level vary as well and accordingly. Nevertheless, it has steadfastly remained at 75 per cent at the expense of the student and at times to the embarrassment of the professor. With so many variable quantities such as the examinations themselves, the mental capacity of different groups of students, and the calibre of the teaching, it seems illogical that the passing level alone should remain and be considered invariable. This particular problem merits thorough investigation and study, but further discussion is not within the province of this demonstration.

It seemed to us, in view of the varying degree of severity displayed not only in examinations but in parts of the same examination, that it was not only justifiable but proper to consider as a guide to the passing level, the average grade obtained in a given examination by a given group of students.

At the present time we are viewing the examination as a "measuring stick," for determining relative ability. We are as a rule not particularly concerned about each individual grade but rather, our attention is localized to two groups, the superior and inferior ones or if you will, the first and last fifths of the class. We are interested in the first fifth or superior group because in this group honors are awarded. We are interested in the last fifth or inferior group because it comprises those individuals who will require further careful consideration before advancement, graduation or recognition in the form of licensing is determined upon, favorably or otherwise. To isolate and recognize this relatively inferior group of students is to us, at present, the primary purpose of, and use for, the written examination.

It has been learned through experience with this type of examination that if the passing grade is lowered to a level which is five to six points lower than the class average grade obtained, between fifteen and twenty per cent of the class will be placed in the group to be given the special consideration mentioned. This method has proved satisfactory in our instance and has been used throughout this analysis.

In considering the performance of the participating schools it becomes necessary that the analysis be conducted so as to show individual school performance and relative performance of each, when all are analyzed collectively. This necessitates the use of two passing grades. One, it will be observed, is constant in that it remains the same for all schools. The other is variable, adjusted according to the average grade obtained in the school under consideration.

In the collective analysis (chart 7) it will be observed that when considered as one examination in which three hundred and forty-six students participated, the average percentage grade obtained was 69 per cent and for reasons previously given, the passing grade was placed at a level six points lower, 63 per cent. On this basis, 79 per cent were passed and 21 per cent were failed.

| ANALYSIS COMPREHENSIVE SPECIAL SURGERY 1936 |              |          |        |        |
|---|--------------|----------|--------|--------|
| AVERAGE GRADE OBTAINED - - - - 69%          |              |          |        |        |
| CONSTANT PASSING GRADE - - - - 63%          |              |          |        |        |
| PARTICIPATING SCHOOLS - - - - 4             |              |          |        |        |
| PARTICIPATING STUDENTS - - - - 346          |              |          |        |        |
|   | PARTICIPANTS |          | 79%    | 21%    |
|   | SCHOOLS      | STUDENTS | PASSED | FAILED |
| A   |              | 64       | 52     | 12     |
| B   |              | 96       | 87     | 9      |
| C   |              | 57       | 47     | 10     |
| D   |              | 129      | 88     | 41     |
| TOTALS                                      | 4            | 346      | 274    | 72     |

Chart 7

The part contributed to the passing and failing groups by each of the schools can be appreciated by referring to chart 8.

When the schools are compared (chart 9) several interesting facts suggest themselves and are called to your attention.

(1) The average grade obtained in each of three of the schools was quite uniform, school A—69 per cent, school B—71 per cent, school C—70 per cent. In the fourth it was considerably lower, school D—66 per cent.

(2) The examination was least difficult for school B, somewhat more difficult for schools A and C and most difficult for school D, as portrayed in the percentage of failures.

(3) To schools A, B and C, because of the slight difference in their average grades, 69 per cent—71 per cent, the constant passing level placed at 63 per cent is quite fair, but to school D whose average was considerably lower it is too severe.

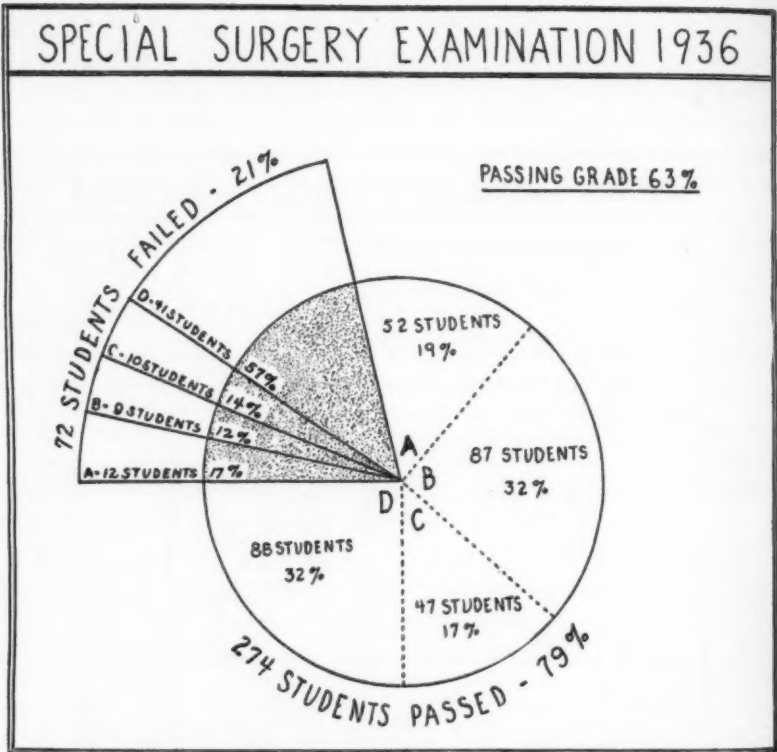


Chart 8

(4) Reflected in percentage of failures and average grades obtained, school B is relatively superior and school D relatively inferior.

(5) The validity of the examination seems to have been established in that the performance of three of the four participating schools was quite uniform.

(6) The difference in school performance displayed and which was most pronounced between schools B and D must, it seems, be either in the quality of teaching or student body or both.



(7) It will be recalled that school C was included chiefly to appraise the incentive factor. In this instance, it obviously made little difference or at least did not unfavorably influence their record which was second only to school B.

Chart 10 shows how adjustment of the passing grade to a level which is six points lower than the respective school average grade, tends to equalize the

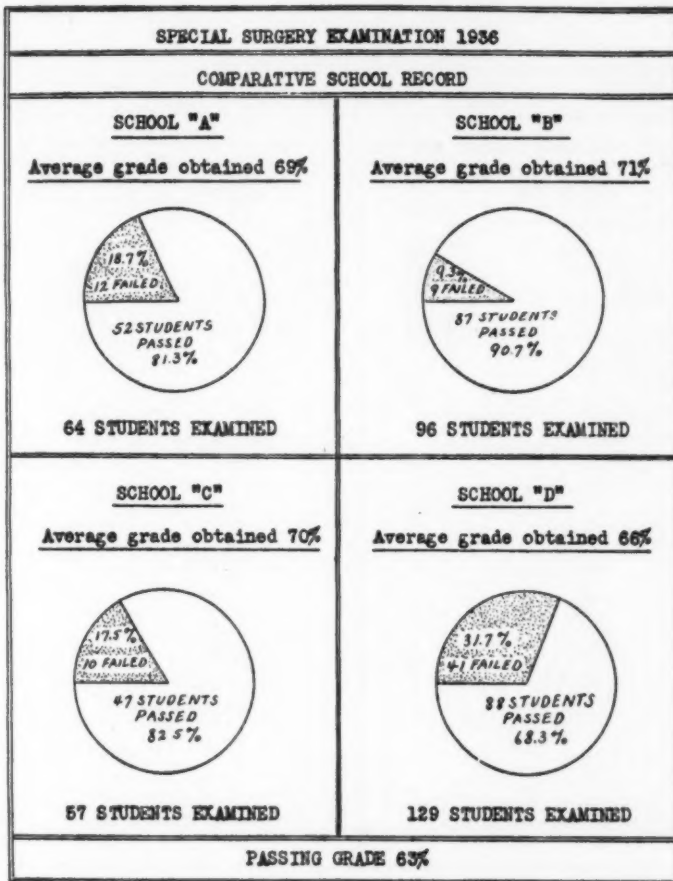


Chart 9

performance of all schools. The primary objective is in this way effectively accomplished in that the inferior fifteen to twenty per cent of students in each school are identified.

Chart 11 is designed to show the comparative distribution of all grades in each of the four schools. In addition to showing the spread of grades, the mean

is evident. It is interesting to observe that the highest grade was 85 per cent and the lowest grade 38 per cent, both of which were obtained in school D; and also the relative infrequency of grades above 75 per cent. The groups labeled "last" represent the failures. The necessity for the adjustable passing level is further emphasized in this graph.

The page grade analysis of school A, as exhibited, is interesting and valuable (chart 12). The high, low and average grade obtained on each page of the

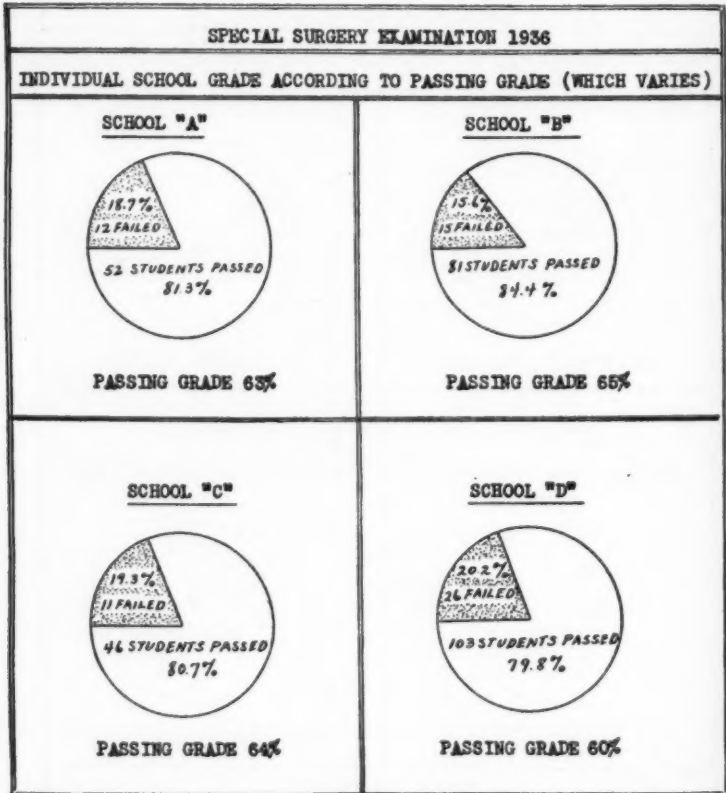


Chart 10

examination is made available for consideration. From this graph one is able to determine what parts of the examination were found more difficult than others by any particular school or group of students. If desired, it is possible, by referring back to the indicated examination pages, to learn what specific questions or subjects were the source of difficulty. By localizing class defects in

this manner one is often able to get a fair impression as to the nature of the difficulty and where the fault lies.

If the page grade analysis of all schools are compared, as in chart 13, it will be seen that certain experiences were shared in common. Data assembled therefrom for your convenience is shown in chart 14.

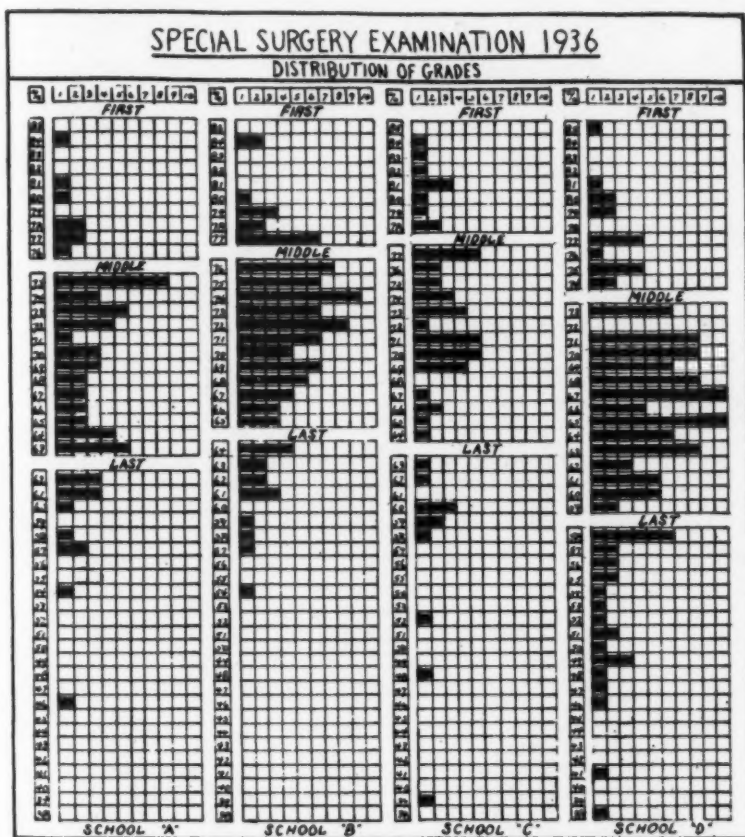


Chart 11

**INSTRUCTIONS:** Each blackened block represents a student and for the sake of convenience, across the top of each school group, the vertical columns are numbered 1 to 10 inclusive. The percentage grades are arranged vertically along side the respective school group.

**EXAMPLE:** In school A (first group) one student obtained the grade of 84%, two the grade of 77%, eight the grade of 75%, three the grade of 62%, etc.

Not the least of the advantages claimed for the objective type examination is attributable to the reliability of grading secured. Of this there can be no

doubt for it has repeatedly been demonstrated to the complete satisfaction of many observers. An example of it is set forth in chart 15. The examination

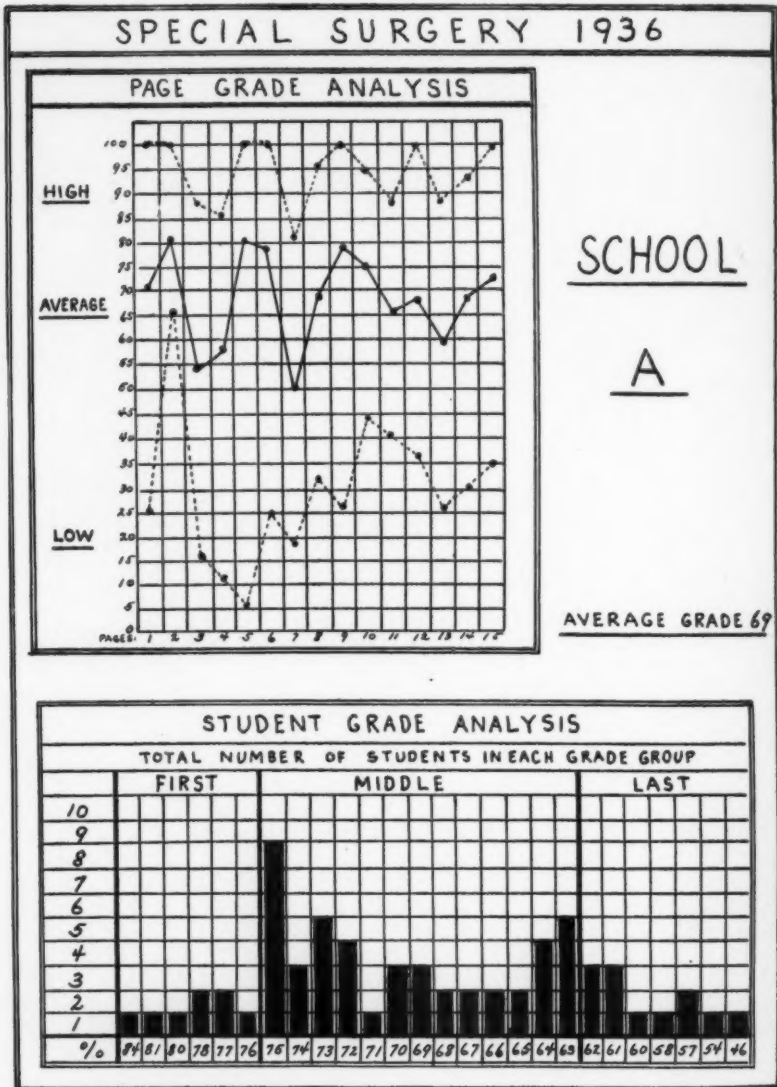


Chart 12

booklets of school D, 129 in number, were first graded by the school department head. I later independently regraded the same booklets. The results are shown

and the degree of difference (average difference, 1%) between inside and outside examiners is surprisingly small. Though slight, much of the difference displayed resulted from errors in addition and transposition of the large volume of figures representing page totals. The record shows that a large proportion

#### SCHOOL PAGE GRADE ANALYSIS

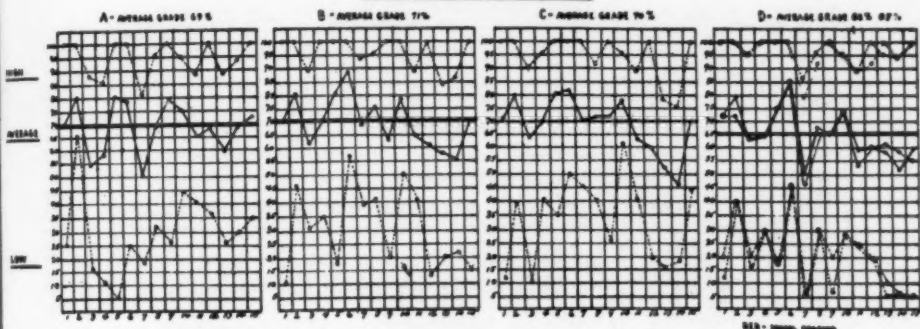


Chart 13

(95%) of student examination booklets can be and are scored with a negligible amount of discrepancy between two independent examiners. This is, not the best, but the usual performance and when compared to that usually obtained in the grading of the essay examination it is indeed impressive.

| DATA ASSEMBLED IN COMPARATIVE SCHOOL PAGE ANALYSIS |  |  |  |  |
|--|--|--|--|--|
|  | PAGES ON WHICH<br>PERFECT SCORES<br>WERE OBTAINED  | PAGES ON WHICH<br>PERFECT SCORES<br>WERE NOT OBTAINED                          | PAGES<br>FOUND<br>EASY                                   | PAGES<br>FOUND<br>DIFFICULT  |
| A  | 1-2-5-6-9-12-15  | 3-4-7-8-10-11-13-14  | 2-5-6-9-10   | 3-4-7-11-13  |
| B  | 1-2-4-5-6-9-10-12-15   | 3-7-8-11-13-14   | 2-5-6-8-10   | 3-9-12-13-14   |
| C  | 1-2-5-6-7-9-12-15  | 3-4-8-10-11-13-14  | 2-5-6-10   | 3-11-12-13-14  |
| D  | 1-2-4-5-6-9-12-13-15   | 3-7-8-10-11-14   | 1-2-5-6-10   | 7-11-12-13-14  |
|  | PAGES: 1-2-5-6-9-12<br>& 15 were answered<br>perfectly by some<br>students in<br>ALL SCHOOLS | PAGES: 3-8-11 & 14<br>were answered<br>perfectly by no<br>one<br>IN ANY SCHOOL | PAGES: 2-5-<br>6 & 10 were<br>easiest for<br>ALL SCHOOLS | PAGES: 3-11-12<br>13 & 14 were<br>most difficult<br>for<br>ALL SCHOOLS |

Chart 14

The examination was designed to be completed in three hours. This period of time was thought to be adequate. Chart 16 shows that this estimate was not bad. The longest time taken for completion was 3 hours and 40 minutes; the shortest time about 2 hours and 10 minutes; the average time, as close as

can be estimated, just under 3 hours. It was impossible to accurately time school A because here the examination was included as part of the larger examination. The time recorded being for this more comprehensive one, it became necessary to obtain a percentage estimate which is unsatisfactory.

It becomes evident that school B, which had the best performance record, took the greatest amount of time, yet, on comparison, it will also be noted that school C, which did almost as well, required time which averaged 17 minutes less. It will be observed further, that school D, though averaging the same time as school C, did not do nearly as well in the examination. One's attention must

| SPECIAL SURGERY EXAMINATION 1936  |         |   |      |
|---|---------|---|------|
| STUDENTS  | PERCENT | <u>COMPARATIVE GRADING SCHOOL "D"</u>       |      |
|   |         | <u>2 DIFFERENT EXAMINERS - 129 Students</u> |      |
| 36  | .279    | IDENTICAL                                   | .736 |
| 59  | .457    | 1 POINT DIFFERENCE                          |      |
| 27  | .209    | 2 POINTS DIFFERENCE                         | .945 |
| 6   | .046    | 3 POINTS DIFFERENCE                         | .991 |
| 1   | .003    | 4 POINTS DIFFERENCE                         |      |
| Average grade as determined by second Examiner<br>one point higher than first Examiner. |         |   |      |

Chart 15

also be called to the fact that the grades of the students utilizing less than the average examination time were at a considerably higher level than those of the students utilizing more than the average time.

On request (questionnaire) of the 346 participating students from the four schools, 299, or 86.4 per cent, frankly stated their preference for either the objective or essay types of examinations. Forty-seven, or 13.6 per cent, for some reason, failed to state a preference. Of the 299 students expressing a preference, 255, or 85.3 per cent, preferred the objective type (short answer) examination, while only 44, or 14.7 per cent, expressed their preference for the essay type. Chart 17 depicts the individual school preference but cannot adequately portray



the universal enthusiasm and approval accorded this type of examination in general and particular. The reasons for endorsement, as expressed by the students (questionnaire), were highly complimentary, enlightening and gratifying, and the appreciation as expressed by the school department heads was all that could be desired.

It was thought that an effort should be made to correlate the grades obtained by the student and school with the respective expressed preferences. This is

| SPECIAL SURGERY EXAMINATION 1936 |                        |     |         |     |         |     |                      |  |                        |   |                        |
|----------------------------------|------------------------|-----|---------|-----|---------|-----|----------------------|--|------------------------|---|------------------------|
| S<br>C<br>H<br>O<br>O<br>L       | INDIVIDUAL SCHOOL TIME |     |         |     |         |     | SCHOOL AVERAGE GRADE | GROUP I  |                        | GROUP II  |                        |
|                                  |                        |     |         |     |         |     |                      | PERCENTAGE OF CLASS<br>UTILIZING LESS THAN<br>AVERAGE TIME | AVERAGE GRADE OBTAINED | PERCENTAGE OF CLASS<br>UTILIZING MORE THAN<br>AVERAGE TIME UP TO<br>MAXIMUM | AVERAGE GRADE OBTAINED |
|                                  | MAXIMUM                |     | MINIMUM |     | AVERAGE |     |                      |  |                        |   |                        |
|                                  | Hrs                    | Min | Hrs     | Min | Hrs     | Min |                      |  |                        |   |                        |
| A*                               | 3                      | 00  | 2       | 08  | 2       | 45  | 69                   | 31   | 72                     | 69  | 67                     |
| B                                | 3                      | 40  | 2       | 25  | 3       | 11  | 71                   | 36   | 73                     | 64  | 64                     |
| C                                | 3                      | 10  | 2       | 15  | 2       | 54  | 70                   | 18   | 74                     | 82  | 70                     |
| D                                | 3                      | 02  | 2       | 10  | 2       | 52  | 66                   | 26   | 69                     | 74  | 65                     |
| ALL SCHOOLS                      |                        |     |         |     | 2       | 55  | 69                   | 28   | 72                     | 72  | 66.5                   |
| * TIME ESTIMATED ON SCHOOL "A"   |                        |     |         |     |         |     |                      |  |                        |   |                        |

Chart 16

shown in chart 18 which is included so that it may be studied by anyone interested. I am reluctant to make any comment other than to say that, in general, the performance of those students failing to state a preference or preferring the essay examination, was considerably inferior to that of the group expressing their preference for the objective type. This observation is again reflected, in that an overwhelming majority of the best students of each school and all schools stated a preference for this type of examination.

## SUMMARY

1. Medical examinations have been considered in a general way, emphasizing their purpose and importance. The types in general use are discussed and the

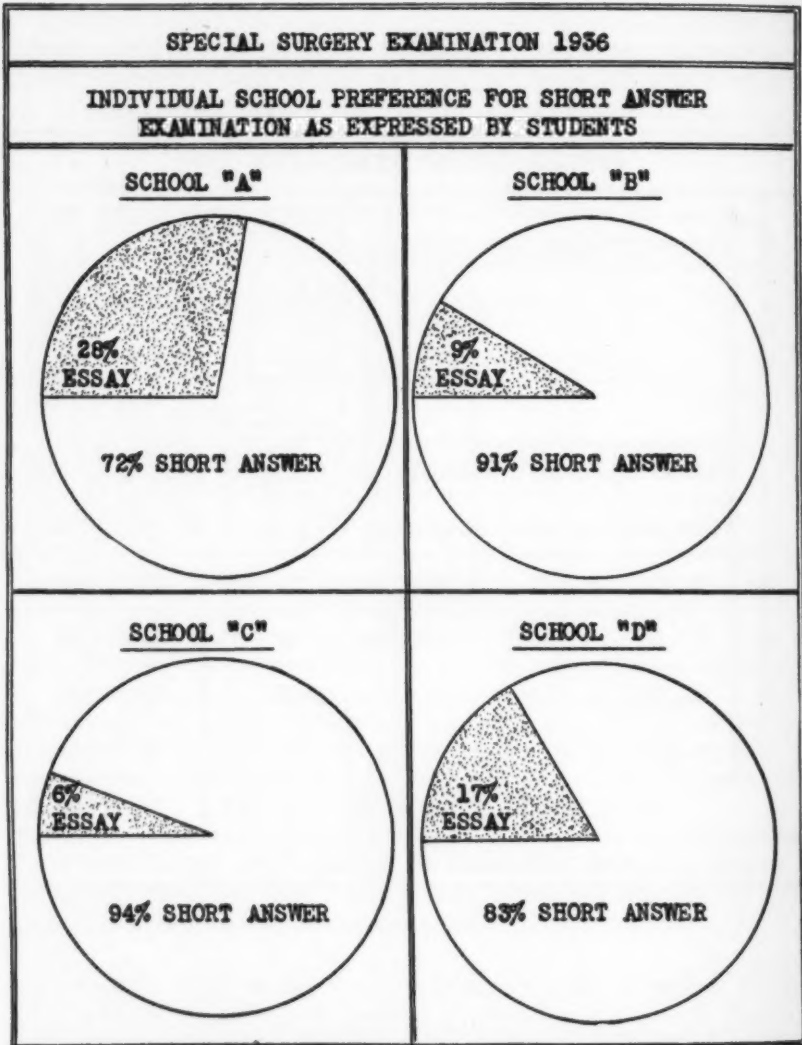


Chart 17

predominant use of the written examination composed almost exclusively of essay type questions is shown.

2. The inadequacy and unreliability of the examination in universal use throughout the medical schools of this country is stressed and the need for improvement is indicated.

3. The traditional essay examination is described and criticized. It is shown how many of the defects inherent in the essay type can be avoided in the use of the newer objective type. Advantages claimed for the objective type examination are reviewed and an attempt is made to dispose of invalid criticisms and prejudices.

| SPECIAL SURGERY EXAMINATION 1936  |   |
|---|---|
| CORRELATION BETWEEN GRADES AND PREFERENCE FOR SHORT ANSWER EXAMINATION  |   |
| SCHOOL "A" - 42 students, 66%, prefer short answer.<br>16 students, 25%, prefer essay type.<br>6 students, 9%, failed to state.   | Average grade 69.4%<br>Average grade 67.0%<br>Average grade 68.3%   |
| SCHOOL "B" - 65 students, 89%, prefer short answer.<br>8 students, 8%, prefer essay type.<br>3 students, 3%, failed to state.     | Average grade 71.4%<br>Average grade 68.2%<br>Average grade 62.0%   |
| SCHOOL "C" - 46 students, 81%, prefer short answer.<br>3 students, 5%, prefer essay type.<br>8 students, 14%, failed to state.    | Average grade 71.6%<br>Average grade 74.3%<br>Average grade 61.3%   |
| SCHOOL "D" - 82 students, 64%, prefer short answer.<br>17 students, 13%, prefer essay type.<br>30 students, 23%, failed to state. | Average grade 66.5%<br>Average grade 62.9%<br>Average grade 65.1%   |
| ALL SCHOOLS preferring short answer. . . . .  | Average grade 69.7%   |
| ALL SCHOOLS preferring essay type. . . . .  | Average grade 68.1%   |
| ALL SCHOOLS failing to state preference. . . . .  | Average grade 64.2%   |
| 10 BEST STUDENTS  | 10 WORST STUDENTS   |
| SCHOOL "A" - 80% prefer short answer<br>20% prefer essay type   | SCHOOL "A" - 40% prefer short answer<br>50% prefer essay type<br>10% failed to state                                    |
| SCHOOL "B" - 90% prefer short answer<br>10% prefer essay type   | SCHOOL "B" - 70% prefer short answer<br>20% prefer essay type<br>10% failed to state                                    |
| SCHOOL "C" - 90% prefer short answer<br>10% prefer essay type   | SCHOOL "C" - 40% prefer short answer<br>0 prefer essay type<br>60% failed to state                                      |
| SCHOOL "D" - 70% prefer short answer<br>10% prefer essay type<br>20% failed to state  | SCHOOL "D" - 40% prefer short answer<br>30% prefer essay type<br>30% failed to state                                    |
| 33 students, 82.6% prefer short answer.<br>5 students, 12.5% prefer essay type.<br>2 students, 5.0% failed to state.              | 19 students, 47.5% prefer short answer.<br>10 students, 25.0% prefer essay type.<br>11 students, 27.5% failed to state. |

Chart 18

4. A comprehensive examination in which the objective type question is exclusively used, is demonstrated as developed in the medical school of the University of Buffalo. Its inclusiveness is displayed and the construction, composition, administration and grading are outlined and discussed. The primary factors influencing the validity of the examination as a whole are mentioned and the importance of, and care required in question construction is emphasized.

Certain axioms to be followed are set forth and examples of questions are exhibited with comments. Methods of obtaining satisfactory questions for use are also suggested. The details of testing, balancing and weighting the examination preliminary to its presentation to the student are discussed and suggestions for the printing, binding and identification of each examination booklet are given.

5. Measures required to facilitate scoring are discussed and the process of grading is demonstrated. The necessity and expediency of a variable passing level which can be adjusted in accordance with other variable factors is discussed and justified. The degree of reliability in grading which is claimed for this type of examination is convincingly confirmed.

6. An effort is made to show that the examination, as described, is actually a collective group of well constructed departmental examinations which, to the benefit of both student and department, effectively replaces the numerous departmental examinations customarily administered. In support of this contention one of the included departmental examinations (surgery) is isolated, and its content analyzed in considerable detail. The surgery part is extracted from the larger more comprehensive examination in order that it may be considered as a complete major department examination. Its comprehensiveness as applied to the field of clinical surgery is demonstrated, and its two hundred questions relating to seventy-six different subjects are enumerated and classified according to subject, region and specialty in order to furnish evidence of adequacy and balance of construction.

7. The use of this surgery examination in other schools is explained. The results are discussed and a comparative analysis of the performance of the four participating schools comprising 346 students is presented.

8. Student and school preference for this type of examination, as compared to the essay type is shown to be overwhelmingly in its favor. The correlation between such factors as time and preference on the one hand, and the student performance on the other, are made manifest.

#### CONCLUSION

In conclusion, I wish to express the sincere desire that through this presentation, the urgent need for improvement of the written medical examination will be further appreciated, and that our experience, as set forth will not only satisfy others as to the superiority and efficacy of the objective type examination, but will aid and stimulate its use in other medical schools. It is hoped that in this way some benefit will have been contributed to medical education in general and the examination problem in particular.

## DISCUSSION

On papers of Drs. E. W. MacEwen, H. S. Diehl, Harry J. Sears and Robert P. Dobbie

DR. F. A. MOSS (Director, Aptitude Test Committee, Washington, D. C.): The last paper was especially interesting to our Committee: In trying to construct an aptitude test to predict what a man will do in school, we are more or less like a group of engineers who are trying to put a tunnel through a mountain that will meet in the center of the mountain with another tunnel started by another group of engineers on the opposite side of the mountain; both groups of engineers make the necessary measurements before beginning construction. If the measurements are correct, they will come together at the proper point in the middle of the mountain, but if either set have made a mistake in their measurements both groups are disappointed for they do not meet as predicted.

We are under the same proposition when we construct an aptitude test. If we fall down in our measurements, the test does not predict performance in medical school. If, on the other hand, the men who make the examinations in the medical school happen to fall down on constructing their examinations our test doesn't predict properly although our test may be fairly reliable. Failure to predict may be the fault of the examiners of the medical school or it may be the fault of the Aptitude Test. The more accurate the examinations become in the medical school, the more objective and reliable they become, the easier it will be to make accurate predictions from the standpoint of aptitude tests or from the standpoint of premedical grades, or from the standpoint of any other criteria.

DR. H. S. DIEHL (University of Minnesota, Minneapolis, Minn.): This symposium has again pointed out that instruments for measuring students' progress in medical school leave much to be desired. In view of this it is gratifying that we are giving our attention and exerting our efforts to improve examination procedures and technics.

At Minnesota we use the objective type of examination in part but a suggestion which is made time and again is that our examinations should be still more objective and more comprehensive. In view of this and Doctor Dobbie's paper, it occurs to me to wonder whether this Association might not make a significant contribution to improvement of examinations and consequently to medical education if it were to undertake the formulation of objective types of questions covering the various fields of the medical course. If large numbers of questions with keys for scoring them were made available to the members of the Association, I am sure that many schools would make use of them.

Most of our faculties are anxious to improve examination procedures, but most of them are engrossed in their own work and have neither the time nor the technics necessary for the formulation of good objective examinations. If large numbers of questions, with the keys for scoring them, were made available in the different fields, they could be used or not by the individual colleges as they saw fit. It is essentially this which the Association has done in regard to aptitude testing, and it seems to me that it would be well to consider the possibility of making a similar contribution to the conduct of examinations within the medical schools.

# Study of Accomplishment of the 1936 Freshman Class in Seventy-eight Medical Colleges in the United States and Eight Medical Colleges in the Dominion of Canada

## Ninth Study

FRED C. ZAPFFE

Secretary, Association of American Medical Colleges  
Chicago, Illinois

A study of the accomplishment of students enrolled in the freshman class of the seventy-eight medical colleges in the United States and eight in Canada which participate in the study by furnishing the information on which it is based has been made since 1928, therefore, the data presented herewith constitute the ninth report. This study would not have been possible without the cooperation of the medical colleges included and for which the Secretary wishes to express his deepest and sincere appreciation. For some colleges, with a large student body, the labor entailed by the preparation of these reports is considerable, and inasmuch as their real worth cannot be appreciated except by those who have the opportunity, at some time or other, to make use of the results accruing from these reports, the reason for making is sometimes questioned. Complete knowledge on this point speedily leads to the conviction that this study is one of the most valuable of the many studies made by the Association of American Medical Colleges.

The reports are used, in the main, in two ways: First, the accomplishment of the freshman class is transmitted to the arts colleges whence these students came. In the "Arts Colleges" file, each year, approximately 600 cards are added to those collected since 1928. Each one of the 600 cards represents one arts college. On this card is entered the name of the student, aptitude test record, if any, admission credits, name of medical college attended, class record and standing. A copy of this card is sent to the arts college with a request that it report on the standing of these students, by thirds, while in college. This information serves as the basis of a study which correlates the scholarship in college with the scholarship in the medical school. Needless to point out that this information can be used to good advantage by the admission officers or committees of the medical colleges. The colleges are very grateful for this information which is not procurable in any other way. Individual medical colleges report to the arts colleges whence their students came, but this report covers only one medical college. The Association's report covers all medical colleges.

Then, every contributing medical college receives a report which covers all 600 arts colleges, names of students and other information of little purpose in



this report being omitted. The report is merely intended to show how the students of these colleges fared in medical school during the first or freshman year. Recently, a composite report, covering six years, was sent to the deans of the medical colleges. These reports should prove most helpful in the selection of students on the basis of what the record of their college has been. If, year after year, many of their college mates have done badly in medical school—then, why accept any more from that source unless there is certainty that the applicant is possessed of a high degree of scholarship?

The reports on students in the sophomore, junior and senior years are added on the cards in the "Student Register"—a scholastic register in which every student in each of the four years is represented by a card on which is shown his full name, address, arts college record, aptitude test rating, application record, name of medical college attended, year of attendance and class record, year by year, with class standing, and, finally, name of hospital in which internship was served—after which, the card is removed from the file. The Register has proven invaluable for supplying information on any student to hospitals, state examining and licensing boards, and whether an applicant is a repeater but forgot to make mention of that fact on his application blank. The preparation of the Register entails an enormous amount of work and time, but it is worth it. Here is the only source of information on medical students dealing solely with their scholastic record. It is based wholly on the reports made by the medical colleges, hence should be correct.

This report, the ninth, concerns the freshman class of 1936-1937. Not all the members of this class began their studies in 1936. Previous studies on this point have shown that a few students began the study of medicine as long as nine years previously; approximately 200 students were repeaters. Hence, there are distressing variations in reported figures, but an analysis invariably discloses the correct figure. We can always tell how many freshmen there were by adding together the figures reported by the medical colleges at the end of the academic year. The figure for the 1936 freshman class is 6,072. At the beginning of the year, enrolment blanks were sent in for 5,906 students. Only a very few repeaters were represented in this total; some students withdrew very early in the course, not later than two weeks after starting. These additions and subtractions brought the final figure to 6,072. The largest freshman class ever reported on was the 1934 class which numbered 6,683 students. The class of 1935 numbered 6,352 students; the 1936 class, 6,072 students, a drop of almost 10 per cent in two years.

#### COLLEGE DATA

The constitution and by-laws of the Association of American Medical Colleges provide that member colleges may accept applicants from arts colleges which have not been approved by any recognized standardizing agency, provided that notice of such acceptance is filed in the office of the Association. Member colleges always have availed themselves of this privilege but with diminishing frequency. Of the freshmen class of 1936, only 200 students (3.3%) came

from nonapproved colleges, as against 241 (3.8%) in 1935 and 298 (4.5%) in 1934. The number of colleges represented by this group has also become less: 114 (18.5%) in 1935, as against 88 (14.9%) in 1936.

The total number of colleges represented by the freshman student body in 1936 was considerably smaller than in 1935—587 as against 615, of which 501 and 499, respectively, were colleges approved by state or national, or both, evaluating agencies. Whether this drop has any significance, cannot be stated. Each year, about two thirds of the colleges are represented by three or more students; the remaining third group is a fluctuating one, sometimes represented and sometimes not; usually not sending more than one student to a medical school. It is a variable group; an occasional feeder for the medical schools. The colleges in the two-thirds group are represented year after year.

#### ACCOMPLISHMENT OF STUDENTS FROM NONAPPROVED COLLEGES

In table 1 the accomplishment of the students from the nonapproved colleges is presented. A comparison of these data with those of students from approved colleges shows clearly that, as a group, they do not give as much promise of being able to carry on. A smaller number earns a clear record; the number with encumbered records is larger and nearly one-fifth fail of promotion to the sophomore year. The exact figures are: Clear record, 59 per cent; encumbered record, 22 per cent; failed, 14.5 per cent; withdrew for reasons other than poor or failing scholarship (or reason for withdrawal not known), 4.5 per cent. Thus, 19 per cent will not go on with sophomore work.

TABLE 1. Accomplishment of Students (200) from Nonapproved (88) Colleges (Percentages)

| Entrance Credits | Clear | Encumbered | Failed | Withdrew | No. Total |
|------------------|-------|------------|--------|----------|-----------|
| 2 years .....    | 50.0  | 23.3       | 13.1   | 13.1     | 38        |
| 2 plus .....     | 63.6  | 27.2       | 9.2    |          | 11        |
| 3 years .....    | 57.5  | 26.3       | 13.7   | 1.6      | 66        |
| 4 plus .....     | 66.6  | 33.3       |        |          | 6         |
| A. B. ....       | 65.1  | 20.9       | 11.6   | 2.3      | 43        |
| B. S. ....       | 61.1  | 8.4        | 25.0   | 5.5      | 36        |
| Totals: No. .... | 118   | 44         | 29     | 9        | 200       |

It is apparent, then, that the hazard taken by accepting a student from a nonapproved college is greater than in the case of students from approved colleges, on the whole. However, the records also show that year after year certain approved colleges make a very poor showing in the medical schools. These colleges and the nonapproved colleges constitute a definite group from which applicants must be accepted with extreme care and only with the aid of every possible means of measurement and the annual reports which are sent to the deans by this Association in which this information is given.

It is also significant of this group that students who had only 60 hours of college work made a very poor showing. Only 50 per cent succeeded in getting a clear record. The greatest number of failures was made by the B.S. group,

25 per cent, which is nearly twice the average for the entire freshman class; the average of this particular group being 14.5 per cent. Doubtless there is an explanation for this, one which general educators can make.

#### PREPARATION FOR THE STUDY OF MEDICINE

For many years there has been heard an insistent demand to increase the minimum requirements for admission to medical colleges from 60 hours, two years, to 90 hours, three years, in order to reduce the number of medical students. As a matter of fact, the analysis of the entrance credentials of new students gives indisputable proof that to raise the requirements will not reduce such numbers at all because there is a definite trend on the part of students who intend to study medicine to remain in college for more than two years. Whether this trend is the result of a conviction that two years is insufficient as a proper preparation or that a greater number of credits will insure acceptance by a medical college cannot be determined. However, each year fewer students offer the minimum and more students offer a degree. True, a degree does not, necessarily, indicate better preparation nor a greater aptitude for the study of medicine; nor does the minimum preparation indicate the opposite. The fact remains that that is what is taking place.

Of the 6,072 freshmen in 1936-1937, only 6.6 per cent had the minimum of 2 years, 60 hours, of college work; 3.5 per cent had more than 60 hours but less than 90 hours, most of that group having taken an additional summer semester.

TABLE 2. Summary of Entrance Credits of 1936-1937 Freshmen.

|                 | No.  | %    |                 |
|-----------------|------|------|-----------------|
| 2 Years .....   | 410  | 6.6  |                 |
| 2-3 Years ..... | 207  | 3.5  |                 |
| 3-4 Years ..... | 1773 | 29.3 |                 |
| 4+ Years .....  | 305  | 5.0  | No degree 44.4% |
| A.B. ....       | 2024 | 33.3 |                 |
| B.S. ....       | 1353 | 22.3 | Degree 55.6     |

Thus, only 10.1 per cent had less than three years of college work (13.0 per cent in 1935). The next group, students who had had three or more years of college work but who did not receive a bachelor's degree, accounts for 34.2 per cent of the total of 6,072 students. Many of these students had three and one-half years; some four years; a few as many as nine years of college work—but no degree. In the degree holding group, 33.3 per cent held the A.B. degree; 22.3 per cent, the B.S. degree, or a total of 55.6 per cent of degree students! Why increase the minimum entrance requirements? And, as will be shown later, the two years group does not contribute the largest number of failures in the first year in medicine.

Only 27 schools, or 35.1 per cent, of all medical schools are on the two years of college work basis; 42, or 54.4 per cent, require three years of college work; 7 schools, or 10. per cent, require between two and three years of college work (62, 64, 64, 65, 70, 72 and 85 hours), and 1 school admits only on the basis of a bachelor's degree or better. One other school has announced that in

1938 it will require the bachelor's degree for admission. However, the published requirement of two or three years of college work does not necessarily signify that students offering this credit will be accepted. The best prepared applicants are accepted and they may all fall in the three year group or even the degree group, but by keeping the requirement down to the minimum, or slightly above, it is possible to accept students who are the right sort of men wanted in the medical profession. In other words, quality—scholarship—not credits, are the basis of acceptance. This point has been discussed at length in an editorial in the September, 1937, issue of the JOURNAL of the Association of American Medical Colleges.

#### ACCOMPLISHMENT IN FIRST YEAR OF MEDICAL COURSE

Table 3 presents a summary of the accomplishment of 6,022 1936-1937 freshmen. Fifty freshmen are not included in this list because they will not receive a rating until after the completion of the sophomore year. It will be noted that 71.9 per cent came through with a clear record, no conditions, failures or other encumbrances. In the previous year (1935), this percentage was 71.7. The "encumbered" group accounts for 14.9 per cent as against 13.8 per cent in 1935. Students who for one reason or other failed to complete their work but whose record was "clear" otherwise are included in this group. In the "out" group are included students who "failed," were dropped, must repeat the year or withdrew because of poor or failing scholarship or who were asked to withdraw for these reasons. Here, we find 10.0 per cent of the class as against 11.1 per cent in 1935. Each year some students withdraw soon after the course is well under way or just before the final examinations. Some of

TABLE 3. Summary of Accomplishment of 6,022 Freshmen (50 Students who will not be Rated Until After the Completion of the Sophomore Year are not Included).

| Clear |      | Encumbered |      | Out |      | Withdrew* |     |
|-------|------|------------|------|-----|------|-----------|-----|
| No.   | %    | No.        | %    | No. | %    | No.       | %   |
| 4325  | 71.9 | 898        | 14.9 | 603 | 10.0 | 196       | 3.2 |

\*Reason for withdrawal: Illness; finances; not stated. Withdrawal for poor or failing scholarship listed under "out."

these students return to college for further work; some did not like medicine; others elected other fields of activity; a few women students get married and, in some instances, the reason for withdrawal is not made known. The student just "quits." In 1936-1937, 3.2 per cent fell in this group; 3.4 per cent in 1935-1936.

#### "OWN" AND "OTHER" STUDENTS

As is to be expected, there is quite a difference between the accomplishment of students who chose to study in the medical school of the university in which they prepared for the study of medicine and those who chose to attend some other medical school. Perhaps, it is safe to assume that the former represent a carefully selected group, such selection being made possible by reason of the fact that the student and his work are a matter of record and observation for

two or more years. Hence, the best of the home product is selected. This does not apply to the students who come from other universities whose selection is based, in the main, on records, reaction to tests and, perhaps, letters of recommendation, not always a safe criterion for selection.

TABLE 4. Summary of Accomplishment of "Own" and "Other" Students.  
(Own: from parent university; other: from other universities.)

|              | Clear<br>% | Encumbered<br>% | Out<br>% | Withdrew<br>% |
|--------------|------------|-----------------|----------|---------------|
| Own .....    | 77.7       | 12.2            | 7.1      | 2.3           |
| Others ..... | 68.0       | 16.2            | 11.6     | 3.8           |

Table 4 bears out the "better choice" problem. Of the "own" group, 77.7 per cent made a clear record as against 68.0 per cent of the "other" group, a difference of nearly 10 per cent. In 1935, the difference was about 9 per cent. Of the "own" group, 12.2 per cent had an encumbered record, as against 16.2 per cent of the "other" group, a difference of 4 per cent, a trifle less than in 1935 (11.6-15.1). In the "out" group, there is also a difference of 4.5 per cent in favor of the "own" group—7.1 per cent as against 11.6 per cent for the "other" group. In 1935, the percentages were "own," 9.3 per cent; "others," 12.2 per cent, a difference of 2.9 per cent. Even in the "withdrew" group fewer "own" than "other" students appear: 2.3 per cent as against 3.8 per cent. In 1935, these percentages were 3.0 and 3.8.

TABLE 5. Summary of Accomplishment of "Own" and "Other" Students  
on Basis of Preparation for the Study of Medicine\*

|                 |        | Clear    |      | Encumbered |      | Out     |      | Withdrew |     | Totals |
|-----------------|--------|----------|------|------------|------|---------|------|----------|-----|--------|
|                 |        | No.      | %    | No.        | %    | No.     | %    | No.      | %   |        |
| 2 years         | Own    | 177 (1)  | 79.7 | 22 (1)     | 10.0 | 17 (4)  | 7.6  | 6 (4)    | 2.7 | 222    |
|                 | Others | 106 (4)  | 59.2 | 38 (5)     | 21.1 | 23 (3)  | 12.9 | 12 (6)   | 6.7 | 179    |
| 2-3 years       | Own    | 87 (3)   | 73.1 | 21 (6)     | 17.7 | 9 (3)   | 7.5  | 2 (1)    | 1.7 | 119    |
|                 | Others | 57 (5)   | 58.6 | 20 (4)     | 20.6 | 18 (5)  | 18.6 | 2 (1)    | 2.1 | 97     |
| 3-4 years       | Own    | 765 (2)  | 79.2 | 106 (2)    | 11.0 | 69 (2)  | 7.2  | 23 (3)   | 2.4 | 963    |
|                 | Others | 544 (2)  | 67.6 | 124 (2)    | 15.4 | 104 (3) | 12.9 | 32 (3)   | 4.0 | 804    |
| 4 or more years | Own    | 90 (5)   | 70.9 | 22 (5)     | 17.3 | 12 (6)  | 9.4  | 3 (3)    | 2.4 | 127    |
|                 | Others | 98 (6)   | 55.1 | 41 (6)     | 23.0 | 36 (4)  | 16.8 | 9 (5)    | 5.1 | 178    |
| A.B.            | Own    | 442 (2)  | 79.2 | 62 (3)     | 11.1 | 33 (1)  | 5.9  | 10 (2)   | 1.8 | 547    |
|                 | Others | 1057 (1) | 72.9 | 218 (1)    | 15.1 | 127 (1) | 8.8  | 43 (2)   | 3.0 | 1445   |
| B.S.            | Own    | 170 (4)  | 71.7 | 38 (4)     | 16.0 | 20 (5)  | 8.4  | 7 (5)    | 2.9 | 235    |
|                 | Others | 732 (3)  | 66.2 | 175 (3)    | 15.9 | 141 (2) | 12.8 | 47 (4)   | 4.3 | 1106   |

\*Figures in brackets show relative standing of each group as to all six groups represented.

#### COMPARISON OF ACCOMPLISHMENT WITH PREPARATION

The next point of interest is the comparison of accomplishment with the amount or degree of preparation for the study of medicine. These data are shown in table 5. It should be pointed out here that despite the fact that degree holding students outnumber those who do not have a degree, the "own" students

are considerably in the minority as against the "other" students. Of all students, 57 per cent had a degree; A.B., 60 per cent; B.S., 40 per cent. Of the A.B. students, 27.8 per cent were "own;" 72.2 per cent "others." Of the B.S. students, 17.6 per cent were "own," and 82.5 per cent were "others."

Here, too, it is evident that the "own" students ranked higher in accomplishment than the "other" students in all brackets. The numbers of students as well as percentages are given as it is doubtless true that if 50 per cent of a group of two students is a failure, it does not mean much as only one student is concerned. The figures in brackets indicate the rank of the group in relation to the six groups included in the table. It is interesting that the group of "own" students with only two years of college work outranked the A.B. group which tied with the three to four years group. The four or more years group, both "own" and "others," stood low on all counts. Perhaps, the reason lies in the fact that the courses in college taken by the members of this group were somewhat "hit and miss," and included courses which did not add to the student's knowledge so far as medicine is concerned. Some of this group did not attend 30 hours a year in college, taking what they pleased without any definite objective in view. The three to four years group did pretty well, on the whole, ranking next to the A.B. group on all counts. The B.S. group did not do well, although the "others" students in this group outdid the "own" group on all counts.

TABLE 6. Summary of Accomplishment of all Students on Basis of Preparation for Study of Medicine\*

|                 | Clear    | Encumbered | Out      | Withdrew |
|-----------------|----------|------------|----------|----------|
| 2 years         | (3) 69.5 | (3) 15.5   | (4) 10.3 | (6) 4.7  |
| 2-3 years       | (5) 65.8 | (5) 19.2   | (5) 13.0 | (1) 1.9  |
| 3-4 years       | (2) 73.4 | (2) 13.2   | (2) 10.0 | (3) 3.2  |
| 4 or more years | (6) 63.0 | (6) 20.1   | (6) 13.1 | (5) 3.8  |
| A.B.            | (1) 76.0 | (1) 13.1   | (1) 7.4  | (2) 2.4  |
| B.S.            | (4) 68.9 | (4) 16.0   | (3) 10.1 | (4) 3.6  |

\*Figures in brackets show relative standing of each group as to all six groups represented.

Table 6, which depicts the accomplishment of the class as a whole, emphasizes the oft made statement that the A.B. group makes the best record; the three to four years group ranking second, the two years group, third; the B.S. group fourth; the two to three years group, fifth and the four or more years group last. Extreme care should be exercised in accepting applicants who fall into this group. It contributes the fewer clear records and the greatest number of failures of all groups. The two to three years group probably consists of students who, to meet the minimum requirements, take an additional semester



or a summer course but are not a good group from which to accept applicants. The data presented in tables 5 and 6 should have value in the selection of students and make it possible to reduce the mortality of every freshman class.

#### ACCOMPLISHMENT OF WOMEN STUDENTS

Table 7 presents the data on the accomplishment in relation to preparation for the study of medicine of the 320 women students in the 1936-1937 freshman class. There is a reversal of many findings as compared with the class as a whole. In the first place, 65.4 per cent of the women students had a bachelor's

TABLE 7. Summary of Accomplishment of Women Students\*

| Years of Preparation | Clear   |      | Encumbered |      | Out    |      | Withdrawn |      | Total |       |
|----------------------|---------|------|------------|------|--------|------|-----------|------|-------|-------|
|                      | No.     | %    | No.        | %    | No.    | %    | No.       | %    | No.   | %     |
| 2                    | 6 (5)   | 54.5 | 2 (3)      | 18.2 | 1 (3)  | 9.1  | 2 (4)     | 18.2 | 11    | 3.4   |
| 2-3                  |         |      | 1 (5)      | 33.3 | 1 (5)  | 33.3 | 1 (5)     | 33.3 | 3     | 0.8   |
| 3-4                  | 68 (2)  | 79.1 | 8 (2)      | 9.3  | 6 (2)  | 7.0  | 4 (3)     | 4.6  | 86    | 27.0  |
| 4 or more            | 7 (3)   | 63.6 | 2 (3)      | 18.2 |        |      | 2 (4)     | 18.2 | 11    | 3.4   |
| A.B.                 | 100 (4) | 66.4 | 30 (4)     | 20.1 | 14 (4) | 9.4  | 6 (1)     | 4.0  | 150   | 47.0  |
| B.S.                 | 46 (1)  | 80.0 | 5 (1)      | 8.5  | 4 (1)  | 6.9  | 3 (2)     | 4.6  | 59    | 18.4  |
| Totals               | 227     | 71.2 | 48         | 15.0 | 26     | 8.1  | 19        | 5.6  | 320   | 100.0 |

\*Figures in brackets show relative standing of each group in relation to all groups.

degree and only 4.2 per cent had less than three years of college work. And, the B.S. students outranked all other students! The A.B. students ranked fourth; the three years group ranked second; the two years group ran the A.B. group a close second; the two to three years group held the lowest rank. The four or more years group did very well, ranking second, which is contrary to the finding for the class as a whole.

Comparing the accomplishment of the women students with that of the men students, little difference appears except in the "failed" group. Only 8.1 per cent of the women students failed as against 11.0 per cent of the men stu-

TABLE 8. Comparison of Accomplishment of Men and Women.

|                  | Men and Women | Men  | Women |
|------------------|---------------|------|-------|
| Clear .....      | 71.2          | 71.2 | 71.2  |
| Encumbered ..... | 14.3          | 14.3 | 15.0  |
| Out .....        | 10.0          | 11.0 | 8.1   |
| Withdrawn .....  | 4.0           | 3.0  | 5.6   |

dents. Considerably more women than men withdrew, 5.6 per cent as against 3.0 per cent. If some of these withdrawals should be charged as failures, then the women are on a par with the men. As stated above, the reason for withdrawal is not always given, hence it is not possible to give a definite answer to this question. On the whole, it must be said that as students women compare favorably with the men.

## ACCOMPLISHMENT OF REPEATERS

Table 9 gives the data on repeaters of whom there were 203 in the 1936-1937 freshman class. Only 40.5 per cent of this group held a bachelor's degree; 24.1 per cent had had less than three years of college work. These figures are at considerable variance with those given for the class as a whole. Only 59.6 per cent of the repeaters came through with a clear record as against 71.2 per cent of the class as a whole; 14.3 per cent failed of promotion as against 10.0 per cent for the class as a whole. The percentage of encumbered records is considerably higher for this group—21.6 per cent as against 14.9 per cent. It would

TABLE 9. Summary of Accomplishment of All Repeaters.

| Entrance Credits | Clear |      | Encumbered |      | Out |      | Withdrew |      | Totals |       |
|------------------|-------|------|------------|------|-----|------|----------|------|--------|-------|
|                  | No.   | %    | No.        | %    | No. | %    | No.      | %    |        |       |
| 2                | 19    | 50.0 | 9          | 23.6 | 5   | 13.2 | 5        | 13.2 | 38     | 24.1% |
| 2-3              | 7     | 63.3 | 3          | 27.5 | 1   | 9.2  |          |      | 11     |       |
| 3-4              | 38    | 57.5 | 18         | 27.2 | 9   | 13.6 | 1        | 1.5  | 66     | 35.4% |
| 4 or more        | 4     | 66.6 | 2          | 33.3 |     |      |          |      | 6      |       |
| A.B.             | 31    | 67.4 | 9          | 19.6 | 5   | 10.9 | 1        | 2.1  | 46     | 40.5% |
| B.S.             | 22    | 61.1 | 3          | 8.3  | 9   | 25.0 | 2        | 5.5  | 36     |       |
| Totals           | 121   | 59.6 | 44         | 21.6 | 29  | 14.3 | 9        | 4.4  | 203    |       |

appear, then, that trying to salvage the repeater is, at best, not worth while. On second—and, in some cases, third—trial, only slightly more than one-half of this group succeeded in getting by. Many repeaters do not repeat in the school in which they failed of promotion. Had they done this, it is likely that very few would have been successful in earning advancement to the sophomore year. It is something to consider seriously when a repeater applies for admission.

## ACCOMPLISHMENT VS. MEDICAL APTITUDE TEST RATING

It seemed worth while to ascertain how accomplishment compared with the medical aptitude test rating. The raw score percentile was taken for all students who had taken the test in 1934 and/or 1935 as reported by the Committee on Aptitude Test of the Association of American Medical Colleges. It is possible that some students took this test in a school other than the one to which they were accredited or elsewhere than in a college, hence were missed in the count which showed that 4,425, or 73 per cent, freshmen had taken the test.

Table 10 presents some very interesting data on correlation of accomplishment with the test percentile. Inasmuch as the "clear" records of the class were listed according to class standing—upper, middle and lower thirds—the percentiles were also divided into three groups—1-33; 34-66; 67-99. The percentage of clear records increases with the percentiles—60.2, 73.9 and 82.9 per cent, respectively. The percentage of encumbered records, the failures of pro-

motion and the withdrawals diminishes as the percentiles increase. This diminution is especially notable in the case of the failures. Only 3.9 per cent of the upper third percentiles failed as against 6.7 per cent of the middle third and 13.3 per cent of the lower third.

TABLE 10. Accomplishment of Students Who Took the Medical Aptitude Test.  
(4425—73% of all freshmen)

| Percentile<br>Raw Score | CLEAR    |      |           |      |          |      | Encumb-<br>ered |      | Out |      | Withdraw |     | Totals |      |
|-------------------------|----------|------|-----------|------|----------|------|-----------------|------|-----|------|----------|-----|--------|------|
|                         | Upper 3d |      | Middle 3d |      | Lower 3d |      |                 |      |     |      |          |     |        |      |
| 1-33                    | No.      | %    | No.       | %    | No.      | %    | No.             | %    | No. | %    | No.      | %   | No.    | %    |
|                         | 213      | 17.9 | 329       | 27.6 | 174      | 14.6 | 265             | 22.2 | 159 | 13.3 | 52       | 4.3 | 1192   | 26.9 |
|                         | →        |      | 716       | 60.2 | ←        |      |                 |      |     |      |          |     |        |      |
| 34-66                   | 403      | 26.6 | 480       | 31.6 | 236      | 15.6 | 245             | 16.1 | 101 | 6.7  | 50       | 3.3 | 1515   | 34.2 |
|                         | →        |      | 1119      | 73.9 | ←        |      |                 |      |     |      |          |     |        |      |
| 67-99                   | 688      | 40.0 | 492       | 28.6 | 246      | 14.3 | 193             | 11.2 | 68  | 3.9  | 31       | 1.8 | 1718   | 38.8 |
|                         | →        |      | 1426      | 82.9 | ←        |      |                 |      |     |      |          |     |        |      |

The distribution of the clear records by thirds of the class among the three groups of percentiles is also interesting. Of the upper third percentiles, 40 per cent were in the upper third of the class; of the middle third percentiles, 31.6 per cent were in the middle third of the class; of the lower third percentiles, 14.6 per cent were in the lower third of the class. These percentages are based on the number of "clear" records not on the entire percentile group. It is always the lower third which is troublesome. It is the lowest third which contributes the greatest percentage of failures. Almost 30 per cent of the students in the lower third of their class in the arts college fail in the medical school as against less than 3 per cent of the upper third students. Refusal to accept students in

TABLE 11. Accomplishment of Repeaters (130) who had taken the Medical Aptitude Test.

| Percentile<br>Raw Score | CLEAR    |      |           |      |          |      | Encumb-<br>ered |      | Out |      | Withdrawn |     | Totals |      |
|-------------------------|----------|------|-----------|------|----------|------|-----------------|------|-----|------|-----------|-----|--------|------|
|                         | Upper 3d |      | Middle 3d |      | Lower 3d |      |                 |      |     |      |           |     |        |      |
| 1-33                    | No.      | %    | No.       | %    | No.      | %    | No.             | %    | No. | %    | No.       | %   | No.    | %    |
|                         | 7        | 13.0 | 15        | 27.7 | 16       | 29.6 | 13              | 24.2 | 3   | 5.5  |           |     | 54     | 41.5 |
|                         | →        |      | 38        | 70.3 | ←        |      |                 |      |     |      |           |     |        |      |
| 34-66                   | 8        | 16.7 | 14        | 29.1 | 10       | 20.8 | 7               | 14.6 | 5   | 10.4 | 4         | 8.3 | 48     | 36.9 |
|                         | →        |      | 32        | 66.6 | ←        |      |                 |      |     |      |           |     |        |      |
| 67-100                  | 4        | 14.3 | 12        | 42.8 | 7        | 25.0 | 3               | 10.8 | 2   | 7.1  |           |     | 28     | 21.6 |
|                         | →        |      | 23        | 82.1 | ←        |      |                 |      |     |      |           |     |        |      |

the lower third of the class would lessen the mortality of the class as a whole and eliminate only 10 per cent of this group who succeed in getting into the upper third in the medical school.

Table 11 presents the accomplishment of the 130 repeaters who had taken the medical aptitude test. There are some variations in the findings as compared with those of the class as a whole, but it must be stressed, and the point is significant, that 41.5 per cent of the repeaters were in the lower percentile third,

although, and this is a variation, 70.3 per cent of this group made a clear record as against 66.6 per cent of those in the middle percentile third. Of those falling in the upper percentile third, 82.1 per cent made a clear record. And 10.4 of the middle percentile third failed of promotion as against 5.5 per cent in the lower third and 7.1 per cent in the upper third. There is no accounting for these variations.

These two tables doubtless have predictive value hence are deserving of careful study. They show definitely that the aptitude test rating, at least the raw score, does predict for the class, as a whole, but not for the individual student. As with other tests, it can admit a poor student in medical school and exclude a desirable student, which would also be the case if the lower third were eliminated.

DATA ON SOPHOMORES, JUNIORS AND SENIORS, 1936-1937

Table 12 shows how many students continue the study of medicine from year to year. However, it must be remembered that each year students who

TABLE 12. Data on Number of Matriculants who continue Medical Work.

| Year<br>of Entry | Freshmen | Sophomores | Juniors    | Seniors    |
|------------------|----------|------------|------------|------------|
| 1932 .....       | 6457     | 5586 86.5% | 5511 85.3% | 5199 80.5% |
| 1933 .....       | 6650     | 5887 88.5% | 5471 82.2% | 5215 80.8% |
| 1934 .....       | 6683     | 5592 83.7% | 5432 81.2% |            |
| 1935 .....       | 6352     | 5493 86.4% |            |            |
| 1936 .....       | 6072     |            |            |            |

have been out of college for one or more years, for various reasons, return to resume their studies. Therefore, the student body of the sophomore, junior and the senior classes harbors some individuals who began the study of medicine prior to the remainder of the class. As stated elsewhere, some graduates entered on the study of medicine as long as nine years before the date of graduation. The table shows the gradual increase in the size of the freshman class during the worst years of the depression with a considerable drop as soon as times became better and business again gave promise of a good career. There was a 10 per cent drop in 1936 as compared with 1934. The total number of medical students reported on by the colleges for 1936-1937 was 22,212.

TABLE 13. Accomplishment of Sophomores, Juniors and Seniors: 1936-1937.

|                  | Clear | Encumbered | Out | Withdrew |
|------------------|-------|------------|-----|----------|
| Sophomores ..... | 77.4  | 16.0       | 5.1 | 1.5      |
| Juniors .....    | 81.3  | 16.9       | 1.3 | 0.5      |
| Seniors .....    | 96.0  | 2.2        | 1.3 | 0.5      |

Table 13 shows the accomplishment of these three classes. The number of clear records increases from class to class and there are very few encumbered records in the senior class as compared with the preceding three classes. But there are still failures and withdrawals; the former because of poor scholarship, the latter entirely because of illness. It would seem that all the poor students should have been eliminated before the senior year, but such is not the case.

Either extreme leniency on the part of the faculty or a sudden failure of scholarship must account for these failures. In the present instance, 1.3 per cent of failures in the senior class means 70 students, which is rather a large number of failures for the senior class.

#### DATA ON CANADIAN MEDICAL COLLEGES

Owing to the fact that the Canadian medical colleges operate on several plans with reference to the time of admission, it is difficult to present comparable figures. And, thus far, it has not been possible to secure the cooperation in the study of the two so-called French schools—Laval and Montreal—although one of these schools did report the number of graduates, which brings the total number of graduates from the Canadian schools to 443, out of an enrolment of 2,400 students, 10 per cent fewer than in the previous year.

TABLE 14. Accomplishment of Students in Eight of the Ten Medical Schools of Canada.

|                                      | Clear |      | Encumbered |      | Out |      | Withdrew |       | Totals |
|--------------------------------------|-------|------|------------|------|-----|------|----------|-------|--------|
|                                      | No.   | %    | No.        | %    | No. | %    | No.      | %     |        |
| 1st year (6 yr. course)<br>2 schools | 110   | 55.8 | 48         | 24.4 | 37  | 18.8 | 2        | 1.0   | 197    |
| 2nd year (5 yr. course)<br>5 schools | 281   | 72.2 | 64         | 16.5 | 37  | 9.5  | 7        | 1.8   | 389    |
| 1st year (4 yr. course)<br>8 schools | 354   | 75.1 | 77         | 16.4 | 33  | 7.0  | 7        | 1.5   | 471    |
| 2nd year—8 schools                   | 386   | 84.4 | 56         | 12.3 | 11  | 2.4  | 4        | 0.9   | 457    |
| 3rd year—7 schools                   | 342   | 82.6 | 64         | 15.4 | 5   | 1.2  | 3        | 0.8   | 414    |
| Intermediate—1 school                | 30    | 85.7 | 4          | 11.4 | 1   | 2.9  | .....    | ..... | 35     |
| 4th year—7 schools                   | 402   | 92.0 | 29         | 6.6  | 6   | 1.4  | .....    | ..... | 437    |

Table 14 shows the accomplishment of all students by classes. It is apparent that there is considerable weeding out done in the first and second years of the five and six years course, which is reflected by the fewer failures and withdrawals in the next four years of the course, the years which are the four years of the medical course in the medical colleges of the United States. However, the percentage of failures in the final year is 0.1 per cent greater in the Canadian schools than in our own schools. Some students will go lame scholastically at the heel of the hunt.

In some respects this study leads one to feel that there is a tightening up in requirements for promotion; then, again, there is evidence of leniency. Some schools have permitted repetition of a year as many as three times only to have the student fail again. Some schools seem not to exercise sufficient care in the acceptance of repeaters coming from other schools although each year more schools give notice that no repeaters will be accepted. One school admitted seventeen new students to its junior class—all repeaters from other schools! A careful study of the data presented herewith will give the answer to many questions which are propounded from time to time. These figures are not procurable elsewhere, therefore, it is hoped that they will serve a useful purpose and give information which will lead to continued effort to improve conditions everywhere in the field of medical education.

# The Meditations of a Tadpole

There are comforts in the mucous stage  
Of life's deep-veiled mystery  
That diminish as the warp with age  
Is woven in history.

So the frog while in the tadpole stage  
Seems happy and quite care-free,  
And never to think he'll reach an age  
When he must put out to sea.

But so soon his tail its functions fail,  
He feels the queer sensation  
Of growing pains, which in turn entail  
More changes than natation.

To travel well one must see and think,  
Or else, he's a Peter Bell,  
So what the tadpole saw on the brink,  
He's the one that best can tell.

"It's a sordid, soul-depressing place  
That nature has placed me in,  
And no creature with a pride of race  
Would spend his whole life herein.

"I must needs find a happier place  
With more accommodation  
Where I can control with better grace  
My changing locomotion.

"There's an elan vital in the mind  
That guides our every motion  
And by thinking one may always find  
A sortie from stagnation."

So he left the dark and dismal pond  
Of mental suffocation  
To find a land on the brim, beyond  
His fondest expectation.

"I see," quoth he, "I have been a fool  
To remain so long within  
That muddy, insalubrious pool,  
In its slime, its ooze and sin.

"I have made progress, but just begun  
To think of evolution,  
A place in the sun cannot be won  
Without determination.

"The highland air makes for wealth of thought  
The pool, mere vegetation.  
The critic was right who said that thought  
Is the measure of mentation.

"Intelligence can't be measured by  
A mass of information  
And theory will die a sterile thing  
Without some application.

"No matter how good one's thought may be  
Unless they lead to action  
He may never pass the tadpole stage .  
With all its imperfection."

H. McG.



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Number 2

*Freshmen: 1937-1938*

Returns from the medical colleges of the United States shows that the enrolment in the freshman class for 1937-1938 has dropped considerably from that reported for the preceding freshman class at this time, namely, 5,623 as against 5,906, or 9.5 per cent. By the end of the year, it is likely that the total freshmen reported on will number about 5,800, allowing for early withdrawals and repeaters not reported as having enrolled. If that estimate is correct, then the number of freshmen has been reduced by about 11.7 per cent since 1934. Continuing this probable estimate, about 4,400 students will graduate in 1941, allowing for approximately 25 per cent of failures for the class as a whole.

It is significant, also, that only 5.9 per cent of the present freshman class entered with less than three years of college work; 37.2 per cent had more than three years of college work and 56.9 per cent had a degree—32.9 per cent an A.B. and 24.0 per cent a B.S. degree. Among the degrees were also some M.A., M.S. and a few Ph.D. This is a considerable variation from previous years in that very many more students have remained in college for three or more years, and fewer less than three years than in any preceding year. The minimum requirement of two years of college work is almost obsolete as a requirement although if it were raised to three years, some very fine students would be excluded although it is likely that these few would remain in college for another year if the requirement for admission to medical schools were increased to three years.

*Class of June, 1937*

An analysis of the class of 1937, (68 medical colleges in the U. S.), that is, students who successfully completed the four years of medical study, graduates (M.D.) and certificants (M.B.) who will receive the degree of M.D. after the completion of the internship, confirms what has often been said—that it is virtually impossible to base definite statements on available figures without making numerous qualifications—whereas, wherefores, etc.

At the end of the freshman year 1933-1934, (this class became the graduating class of 1937), reports were received at the office of the Association on 6,650 students. Of this number, 5,342 or 80 per cent were reported as having completed their work and received either an M.D. or an M.B. Among these graduates were 721 students (13.5%) who had begun the study of medicine prior to 1933, as follows: 542 began in 1932; 130 in 1931; 33 in 1930; 12 in 1929, and 1, each, in 1928, 1927, 1920 and 1918! Some of these earlier beginners were repeaters; some had to drop out of college for a time for various reasons other than poor or failing scholarship.

Checking on all the cards in the Student Register as of the class of 1937 (including entrants of all years), it appears that 1,521 had discontinued the study of medicine either at the end of the first or the second year, a few after the third year. The latter may return to complete their studies. Of the total of 1,521—815 or 53.6 per cent—failed of promotion at the end of the first (1933-1934) year. Not included in this

figure are 193 students who attended colleges which did not at that time give any rating until after the end of the sophomore year.

Again interesting is the fact that of these 1,521 students who dropped out, 211 began the study of medicine before 1933, as follows: 143 in 1932, 48 in 1931, 9 in 1930, 7 in 1929, 2 in 1928, and 1 each in 1926 and 1918.

The question "Well; what about it?" might be asked after reading these figures. They are quoted to emphasize one point, viz., that it is not possible to make any definite statement as to how many graduates there will be in any year on the basis of admissions to the freshman class until after all the returns have been received four years later. Inasmuch as some students do not graduate until ten years after they have begun the study of medicine, it would be necessary to make a study including a ten year period and, even then, the results would not be absolute. The number of misfits who enter on the study of medicine is large; perhaps, no larger than in other professions. The majority are weeded out at the end of the first year, but a few hang on until the fourth year, in which there are still a few repeaters. Students are given ample opportunity to demonstrate whether they can or cannot carry the load; in fact, sometimes it would seem, without knowing anything at all about mitigating circumstances, that they are given too many chances to make good.

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#### *German Student Exchange*

The German government has established a student exchange (Austauschdienst) which will cooperate with the proper authority of any other country in effecting the exchange of medical students. It is reported that each year ten (10) exchanges will be made, two at each of the following medical schools of Germany: Berlin, Munich, Heidelberg, Freiburg and Duesseldorf. The exchange student will receive room and board and be relieved of fees. His only expense will be that of travel.

It has been suggested that the Association of American Medical Colleges act as the placement agency for the United States. Students and medical colleges who desire to enter into an exchange should, therefore, communicate with the Association for further particulars.

Assistantships, fellowships and other opportunities for further study, as well as internships also are included in the exchange service. The German Physician's Bureau (Reichsaerztekammer), a government bureau, is prepared to enter into arrangements looking toward an exchange or placement of graduates. The head of this bureau, a physician, is really the secretary of health, medical education and medical practice and has authority, under government direction and approval to make exchanges.

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#### *Interesting Data on Freshmen Medical Students*

During a six year period including the years 1930 to 1935 inclusive, 937 arts colleges sent 38,242 students to the medical colleges of the United States. Of these colleges, 152, represented by 241 students have a completely clear record and 182 others did not have any failing students. Of 575 students coming from these 182 colleges, 377, or 65.5 per cent, had a clear record; 198 had encumbrances, i.e., subject conditions and failures. Thus, of the 937 colleges, 280, approximately 30 per cent, can boast of not having sent any students to medical colleges who failed at the end of the freshman year. True, the number of students involved is small, about 2.2 per cent of the total for the five years, but it should be a source of gratification to the colleges concerned. Many more colleges had only a single failure during this period.

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#### *Therapeutics Up-to-Date*

To the Editors, Medical Economics: I am a senior in the medical college of Ohio State University. Recently I wrote to several of the larger and better known drug firms, asking that I be placed on

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their mailing lists to receive their periodic publications. In all cases except one I received a form letter stating that the company's policy was not to send literature to medical students.

Obviously, one of the purposes of such concerns is to make a legitimate profit. Might it not be a good idea, then, if they got off to a good start with the potential M.D.'s, their future customers?

Being a medical student myself, I know how eagerly such material is read by fellows in school.

—Medical Student, Columbus, Ohio

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*True in 1893*

*and Equally True Today*

In 1893, Dr. Delancey Rochester, retiring president of the Buffalo Academy of Medicine, said in an address on the "Prevention of Disease": "While it is undoubtedly true that there have been some excellent physicians who have not received an academic degree in medicine, I think it is also true that they have attained their knowledge at great sacrifice *after* they have graduated in medicine, and might have attained their eminence at a much earlier period if their previous education had been broader. Is it not equally true that no man should devote himself to any one branch of science, such as medicine, until he has been thoroughly founded in general knowledge—arts, sciences, languages and philosophy?"

• •

*Congress on Medical Education  
and Licensure*

The 34th annual Congress on Medical Education and Licensure sponsored by the American Medical Association was held in Chicago, February 14 and 15. Many organizations with medical interests also met, likewise numerous committees, all concerned with the solution of some problem concerned with medical education, licensure or the practice of medicine.

The program of the Congress itself offered reports and papers on licensure,

the functions of the special examining boards, student enrolment, teaching on preventive medicine, obstetrics and nutrition to undergraduates, graduate medical education and topics of special interest to licensing boards: all interesting and worthy of careful reading when that opportunity presents itself.

Two proposals, one by Dr. Wilbur and the other by Dr. Rappleye, gave rise to much spirited discussion out in the corridors and in committee rooms. Dr. Wilbur suggested consideration of a proposal to raise the minimum requirements for admission to medical schools by January 1, 1940, from two years, or 60 hours, of college work, to three years, or 90 hours, although this increase, at the moment, would affect only about 8 per cent (less than 500) students. As was to be expected, this suggestion aroused much discussion. In the main, the question was asked: "Will this increase improve the quality of the students so far as scholastic standing is concerned or will it merely add another year of time?" Then, too, the question whether it might not be wise to drop subject prescriptions and ask for "just three years" with acceptable scholarship, regardless of what subjects were taken.

The Association of American Medical Colleges was not unmindful of the latter proposal when it amended the specific requirements for admission to medical colleges in 1925 and made it possible for a qualified applicant to enter a medical college without meeting the specific subject requirements. It was at that time felt that such action is preferable to applying such a modified requirement to every applicant. On the other hand, if the arts colleges will use the additional year to give the student more chemistry, more physics, more science—which medical colleges have found to be most undesirable, the increase will not be justified and will be a penalty for a few good students who do well in the medical school and who, for financial reasons, cannot afford to spend more time in college.

Dr. Rappleye's proposal to set up a

commission consisting of representatives from every organization which is concerned with medical education and practice and which will act as a "super" council or board of strategy to conserve the best interests of the medical profession, of the physician, as well as of the laity, gave rise to heated discussions, pro and con. Nevertheless, this proposal should receive careful thought and no action should be taken unless it is based on a thorough knowledge of and familiarity with the numerous happenings resulting from government demand. Its primary object is to stem the tide of socialization of medical practice and of the physician.

#### *Correction*

In the January issue of this JOURNAL, p. 38, it was stated that Dr. Friedewald was professor of ophthalmology in the Baltimore Medical College. This is incorrect. He was affiliated with the College of Physicians and Surgeons, Baltimore.

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#### *Wanted: Anatomist*

A member college is seeking an instructor in anatomy, a man particularly qualified in histology and neurology. Salary, \$1,500. Good opportunity for promotion. Address Association office for particulars.

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## College News

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### *Cornell University*

The Board of Trustees of Cornell University has ruled that no more students would be admitted to study medicine at Ithaca after June 30, 1938. Students have had the option of taking their first year at Ithaca and the remainder of their course at the Cornell University Medical Center in New York City. The division of medicine at Ithaca will be continued as a center of research and of service to the colleges of the university.

♦ ♦

### *University of Oklahoma School of Medicine*

At a meeting of the Board of Regents of the University of Oklahoma held January 3, 1938, on the recommendation of the faculty of the medical school the premedical educational requirements for admission to the School of Medicine of the University of Oklahoma were raised from two years to three years, or ninety (90) college credit hours, exclusive of physical education or military science. The new requirements will become effective with the freshman class to enter the medical school in September, 1939.

♦ ♦

### *University of Virginia Department of Medicine*

The fourth postgraduate course in ophthalmology and otolaryngology, including a series of lectures and clinics sponsored by the University of Virginia, was held at the Medical School December 14-17, 1937. The speakers included Dr. F. H. Adler, University of Pennsylvania; Dr. Bernard Samuels, Cornell University Medical College; Mr. E. B. Burchell, Eno Laboratory, New York Eye and Ear Infirmary; Dr. James W. White, New York University; Dr. Oscar Batson, University of Pennsylvania; Dr. Vincent Archer, University of Virginia; Dr. Robert E. Buckley, Manhat-

tan Eye, Ear and Throat Hospital, and Dr. Stacey R. Guild, Johns Hopkins University Hospital. Thirty-three physicians were registered for the course.

♦ ♦

### *Western Reserve University School of Medicine*

December 15, 1937, the staff of the laboratory of anatomy entertained five hundred of Cleveland's leading citizens at a surprise tea in honor of the twenty-fifth anniversary of Dr. T. Wingate Todd, as professor of anatomy.

His associates presented him with two fine etchings and some books.

♦ ♦

### *Medical College of Virginia*

Founders' Day exercises marking the anniversary of the one hundredth year of the Medical College of Virginia, were held December 7. Sir Austin H. Clark, Director of Press Service, American Association for the Advancement of Science, spoke on "Science in Colonial Virginia." The college will celebrate its centennial during the current season.

Enrolment for the session 1937-1938 totalled 302.

The new outpatient clinic erected at a cost of \$550,000.00 is scheduled for completion December 15. This building was made possible by a gift of \$300,000 from a friend of the institution and a grant of \$239,850 from the Public Works Administration. The new dormitory under construction at a cost of \$313,000 is scheduled for completion in April, 1938. This building will house 147 occupants and provide cafeteria service for students and house staff.

At its next meeting in the spring, the ex-interns association of the college will present a portrait of the late Dr. Manfred Call. Dr. Call was at one time dean of the school of medicine and at

the time of his death was clinical professor of medicine.

Dr. J. A. Myers, president of the National Tuberculosis Association and professor of preventive medicine at the University of Minnesota, was a recent guest at the college. Dr. Myers lectured to the students on "Modern Weapons in the Control of Tuberculosis."

Additions to the adjunct faculty: Dr. Thomas Beath, instructor in surgery; Dr. A. G. Brown, III, instructor in medicine; Dr. B. J. Rawles, Jr., instructor in surgery; Dr. J. D. Kernodle, assistant in pathology, and Dr. Clair R. Spealman, associate in physiology and pharmacology.

Dr. Lewis E. Jarrett, director of the hospital division, has been elected vice-president of the American Hospital Association.

Lieutenant-Colonel E. B. Maynard this session has been detailed head of the R.O.T.C. medical unit, which was reestablished last year.

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#### *University of Vermont School of Medicine*

Reading facilities in the medical library are being improved with the addition of a third room for special study and the use of faculty members. New reading tables and chairs have been bought. A room in the basement of the medical building will be used to store such books as are not in daily use. This will make more room in the library for students to work.

The medical library of the late Dean, J. N. Jenne, comprising about 500 books, willed to the medical school library, is being put on the shelves, and duplicate books are in some cases being placed in departmental libraries. Some of the duplicates have also been sent to the Mary Fletcher Hospital. Departmental libraries are maintained in the department of anatomy, pathology, chemistry, physiology and pharmacology.

Included in the medical library of the University are 10,000 volumes and 15,500 pamphlets. One hundred fifty-

one current medical journals are on file and loose-leaf systems of medicine and surgery are kept up to date.

In addition to the medical library of Dean Jenne, medical libraries have been willed to the University library by the late Dean H. C. Tinkham, Dr. D. C. Hawley, Dr. F. T. Kidder, Dr. F. W. Sears, Dr. J. L. Campbell, Dr. I. C. Eisenberg, Dr. E. W. Shipman, Dr. R. T. Johnson, Dr. G. B. French, and the Doctors Bullard. Dr. T. S. Brown of the medical faculty also has presented the library with some valuable old medical books. The State Laboratory of Hygiene offers for the use of students of the college its complete list of medical journals and periodicals.

The Stone Memorial Library, consisting of a number of books given by Mrs. Bingham H. Stone, wife of the late professor of pathology, and of current books and periodicals purchased with the income of the Stone Memorial Fund, is an integral part of the medical library. The Stone Memorial Fund was contributed by the family, associates and friends of Dr. Stone, and the income is used for purchasing books in the field of pathology and related subjects.

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#### *Loyola University School of Medicine*

New appointments: Dr. Ralph L. Ferguson, formerly of Ohio State University Medical School, associate professor of bacteriology; Dr. James W. Henry, formerly teaching fellow in pathology at Loyola University, instructor in pathology; Dr. Clarence A. Maaske, formerly instructor in physiology at the University of Wisconsin, same position at Loyola; Dr. Yvo T. Oester, formerly assistant in the department of physiology at the University of Chicago, instructor in pharmacology; Dr. Mary Patras, instructor in physiology; Dr. Stewart C. Thomson, associate in anatomy; Dr. A. A. Pearson, formerly instructor in anatomy at the University of Chicago, associate in anatomy; David S. Jones, Ph.D., University of Minnesota, 1937, department of anatomy; Dr.



Fred Snyder, formerly assistant in general chemistry at Purdue University, instructor in chemistry.

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*Women's Medical College  
of Pennsylvania*

Teachers of premedical sciences and deans of women in arts colleges attended a conference on "Opportunities for Women in the Medical Profession and the Selection of Medical Students" called by the college. Speakers were: Dr. Ellen C. Potter, director of medicine, Department of Institutions and Agencies, State of New Jersey; Mrs. Chase Going Woodhouse, managing director, Institute of Women's Professional Relations; Dr. Marion Fay, professor of chemistry, Woman's Medical College of Pennsylvania; Dr. Emily P. Bacon, professor of pediatrics, Woman's Medical College of Pennsylvania, and Dr. Edward S. Thorpe, Jr., assistant to the dean, University of Pennsylvania School of Medicine.

The purpose of the conference was to promote mutual understanding among premedical and medical teachers as to the intellectual and personality qualities which make for success in the medical profession. The conference was held February 26, 1938, at the Woman's Medical College of Pennsylvania, Henry Avenue and Abbottsford Road, East Falls, Philadelphia, Pennsylvania.

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*Columbia University  
College of Physicians and Surgeons*

Columbia University recently received the following gifts for medical purposes:

W. K. Kellogg Foundation, \$15,000 for study of rheumatic fever; Rockefeller Foundation, \$7,333 for study of the common cold; Philip H. Hiss, \$2,300 added to the Philip H. Hiss Jr. Memorial Fund in the department of bacteriology; estate of F. Trubee Davison Jr., \$1,500 for study of leukemia, lymphosarcoma and allied diseases; Anna Ful-

ler Fund, \$1,500 for tissue culture work in the Institute for Cancer Research; William J. Matheson Foundation, \$1,200 added to the Matheson Encephalitis Fund; Dr. John D. Kernan, \$1,000 for the otology research fund.

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*Wake Forest College  
School of Medicine*

In cooperation with Rex Hospital, Raleigh, the college plans to establish a school of medical technology, it was recently announced. The degree of bachelor of science in medical technology will be awarded for two years in the school, one in the hospital and one in practical work. Dr. Coy C. Carpenter, dean of the Wake Forest medical school, will be director of the school of technology.

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*University of Illinois  
College of Medicine*

The new building containing the medical and dental laboratories has been completed. The new unit cost \$1,550,000. Seven of the fifteen floors are devoted to the medical facilities and the rest to the dental clinics. New equipment includes a biplane fluoroscope. A cancer clinic is to be started in lead lined rooms in the basement with \$300,000 already appropriated for radium and equipment.

The Charles Sumner Bacon lectures for 1937-1938 were delivered February 18 and 19 by Dr. Carl G. Hartman, of Johns Hopkins University and the Carnegie Institution of Washington. Dr. Hartman spoke on "The Physiology and Control of Menstruation" and "The Physiology and Control of Ovulation."

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*Boston University  
School of Medicine*

Dr. J. Emmons Briggs, professor emeritus of surgery and trustee of the University, and Mrs. Briggs, have given \$100,000 to the school and their former residence.

### *Long Island College of Medicine*

On Friday, December 17, 1937, the fiftieth anniversary of the founding of the Hoagland Laboratory was commemorated. The event took on added historical significance because of the fact that the Hoagland was the first laboratory erected in the United States, endowed by private funds, to be devoted to research in bacteriology and allied sciences. It was founded only two years after the Pasteur Institute in France, and four years before the Koch Institute in Berlin.

Dr. Oswald T. Avery, of the Rockefeller Institute for Medical Research, formerly of the Hoagland Laboratory staff, delivered an address in the amphitheatre of the old Hoagland, on "The State of Bacteriology Fifty Years Ago and Today." In the evening, a dinner was served at the Hotel Bossert, at which three former members of the research staff of the Hoagland Laboratory, Dr. Oswald Avery, Dr. Benjamin White and Dr. Harold Lyall, were guests of honor.

Dr. Joshua M. Van Cott, president of the trustees of the Hoagland Laboratory, was toastmaster. Brief addresses were delivered by Dr. Frank L. Babbott, president of the Long Island College of Medicine, Mr. William D. Hill, secretary-treasurer of the Hoagland Laboratory, Henry A. Ingraham, Henry C. Turner and Dr. Wade W. Oliver, professor of bacteriology.

Dr. J. Hamilton Crawford has been appointed professor of clinical medicine and director of medicine on the Long Island College Division at Kings County Hospital.

November 30, 1937, the Red Hook-Gowanus Health and Teaching Center, at 250 Baltic Street, Brooklyn, was formally dedicated. This constitutes Brooklyn's first combined district health and training center, and it contains laboratories and classrooms for fourth year students of the Long Island College of Medicine, who in small groups serve a full time month's clerkship during their

senior year. During this time, the students not only participate in the actual work of the clinics, but make studies of the economic, environmental and various other factors governing disease, and the methods of community health. Dr. Alfred E. Shipley is professor of preventive medicine and community health of the Long Island College of Medicine; Dr. Leopold Rohr, Director of the Health Center, is a member of the College department.

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### *Duke University School of Medicine*

In December, 1937, the Duke University Medical Society was organized to facilitate the presentation of current medical problems before the students, the staff and other interested persons in the University and professional community. Meetings are held monthly during the academic year, and the programs usually consist of short case presentations and discussions followed by a description of some staff or student research project. Occasionally, guest speakers from other institutions are invited to participate in the programs. The first meeting was held December 7th, at which Dr. Wiley D. Forbus gave the introductory talk, and Dr. D. T. Smith spoke on "Experimental Canine Black Tongue." At the second meeting, held January 11th, Dr. W. G. Wyckoff, of the Rockefeller Institute, Princeton, N. J., was the guest speaker, his subject being "The Ultracentrifugal Study of Macromolecules."

On January 10th, Dr. James S. Plant, Director of the Essex County (Newark) Juvenile Clinic, under the auspices of the Family Welfare Association of Durham, spoke on "The Mental Hygiene Approach to Life."

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### *University of Southern California Medical School*

Dr. Solomon Strouse, formerly of Chicago, has been appointed associate clinical professor of medicine.

*University of Minnesota  
Medical School*

Dr. J. C. Litzenberg, professor and head of the department of obstetrics and gynecology, presented a paper at the Conference on Better Care of Mothers and Babies called by the Children's Bureau of the U. S. Department of Labor in Washington, January 17, 1938, on "What Is Good Care for Mothers and Babies?"

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*New York University  
College of Medicine*

Following a recent meeting of the Council of the University the appointment of Dr. John Hugh Mulholland as assistant dean, effective February 1, 1938, was announced. Dr. Mulholland, an alumnus of the class of 1925, is also assistant clinical professor of surgery at the College of Medicine.

The promotion of Dr. John A. Lawler, Jr., to an assistant clinical professorship in surgery was approved.

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*Ohio State University  
College of Medicine*

Founder's Day Program celebrating the 104th Anniversary of Ohio State University College of Medicine is announced for March 3, 4 and 5. The college is a direct descendant of the Willoughby Medical College of Willoughby, Ohio, which opened in 1804. Among the principal speakers will be Dr. James Sargent, an Ohio State Alumnus, recently named president of the Wisconsin State Medical Society and Dr. Karl A. Menninger, psychiatrist, of Topeka, Kansas. Dr. Sargent will discuss "The Present Challenge to the Medical Profession." Dr. Menninger will give the annual Alpha Omega Alpha address on "The Scientific Study of Personality."

The medical anniversary program is set up largely as a postgraduate review for medical alumni to encourage post-collegiate study on the part of graduates. Ninety-six faculty members and associ-

ates will be on the program. Founder's Day will be commemorated with an alumni and class luncheon. The Golden Jubilee Class of 1888 together with the classes of 1898, 1908, 1918 and 1928 will be making special reunion efforts. The various medical fraternities and sororities also will have dinners and luncheons during the three days honoring their returning alumni.

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*Jefferson Medical College*

Dr. Karl Kornblum, assistant professor of radiology, Graduate School of Medicine, University of Pennsylvania, and Director of the X-ray-Radium Department, Graduate Hospital of the University of Pennsylvania, has been elected professor of roentgenology to succeed the late Dr. Willis F. Manges. He is a member of the American Roentgen Ray Society and the American College of Radiology, as well as a number of other scientific societies. Doctor Kornblum assumed his duties January 1, 1938.

Promotions: Dr. Thaddeus L. Montgomery, to clinical professor of obstetrics; Dr. A. Spencer Kaufman, to associate professor of otology; Dr. Arthur J. Wagers, to assistant professor of laryngology; Dr. Austin T. Smith, to assistant professor of laryngology; Dr. William P. Hearn, to assistant professor of surgery; Dr. Andrew J. Ramsay, to assistant professor of histology and embryology.

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*Meharry Medical College*

Mr. Edward S. Harkness, New York City, has given the college \$20,000 to supplement \$10,000 raised by the college, for the establishment of a tumor clinic. The money raised by the college was contributed by alumni, faculty, students and employees of the college, business firms in and outside of Nashville, other individual friends and the Board of Education of the Methodist Episcopal Church.

The college is also effecting a reorganization of its teaching program.

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## General News

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### *Fellowship at the Medical Faculty, University of Geneva 1938-1939*

Announcement is made of a fellowship for postgraduate study at the Medical Faculty of the University of Geneva, for the academic year 1938-1939, October to July. The appointment provides a stipend of 3000 Swiss francs which has been found sufficient to cover living expenses for the academic year on a moderate scale. It does not provide for the steamship passage or other traveling and incidental expenses. The appointee must pay the matriculation and semester fees at the University, totaling about 60 Swiss francs, and any laboratory fees that may be required. Good opportunity is offered for study in the fields of general medicine, ophthalmology, pathology and child psychology.

To be eligible, an applicant must be an American citizen, holder of the M.D. degree from an approved American medical school, and must have an adequate command of the French language both written and spoken. Either a man or a woman may apply; preference will be given to unmarried candidates under 35 years of age.

The fellowship is administered by the Swiss American Student Exchange under the auspices of the Institute of International Education. The final decision on the applicants is made by a committee in Switzerland. Applications with accompanying credentials must be filed at the Institute in New York by March 1, 1938. Application forms may be obtained from Student Bureau: Institute of International Education, 2 West 45th Street, New York.

### *Frederick G. Novy Fellowship Fund for Research in Bacteriology*

The alumni of the University of Michigan Medical School will initiate

a 10 year campaign for the endowment of the Novy Fellowship Fund which will be administered by the board of regents of the University, the principal sum to remain intact and disbursements from earnings to be made on recommendation of the director of the department of bacteriology and the executive committee of the Medical School to the president of the University and the board of regents. The fund is to be used only for nonrecurrent research purposes.

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### *Cancer Research in Omaha*

The Creighton University Tumor Clinic at St. Joseph's Hospital, Omaha, has received a bequest of \$1,600 which is to be the nucleus of an endowment fund, the income to be used for cancer research.

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### *Heckscher Foundation for Children*

This Foundation recently established a department of hygiene and preventive medicine of which Dr. Heinz R. Landmann is the director. A child guidance clinic has also been started under the direction of Jacob S. List, Ph.D., a psychologist.

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### *William Freeman Snow Medal for Distinguished Service in Social Hygiene*

Dr. William F. Snow, managing director of the American Social Hygiene Association, was presented with a bronze medallion portrait of himself. It is planned to strike a medal from the original sculpture and award it, from time to time, as the William Freeman Snow medal for distinguished service in social hygiene. A committee of the board of directors of the association will make the awards.

### *Residency in Physical Therapy*

A residency in physical therapy has been established at the Los Angeles County General Hospital. The resident must be a graduate of an approved medical school of recognized standing, must have completed satisfactorily one year's rotating internship in an approved hospital and possess, or be able to secure promptly, a physician and surgeon's certificate to practice in California. His experience must include one year's recent full time experience in the administration of physical therapy in an approved hospital, some of which must have been in a supervisory capacity. The Los Angeles County Civil Service Commission will give additional information concerning the residency.

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### *Alvarenga Prize for 1938*

The College of Physicians of Philadelphia announces that the Alvarenga Prize for 1938, amounting to about \$200, will be awarded July 14, 1938, to the author of the best work on any branch of medicine which may be deemed worthy of the prize. The prize paper will be selected from contributions published since January 1 and brought to the attention of the committee before May 1, 1938, by the author or by other sponsors, or from unpublished studies submitted to the committee in typewritten manuscript and received before May 1. Communications should be addressed to the Alvarenga Prize Committee, 19 South Twenty-second Street, Philadelphia, Pennsylvania.

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### *Association of Medical Students*

The Association of Medical Students, a recently formed organization, opens its membership to students in all approved medical schools in the United States. The Association started in 1934 with a group, which grew until last year it held versity in Baltimore. The need for a medium for student expression was the prompting factor in the formation of the group, which gred until last year it held

a convention at Johns Hopkins University School of Medicine, with a considerable attendance of medical students, at which time formal organization took place.

This year's convention was held in Chicago with an attendance of more than 200 delegates, representing thirty-seven medical schools. At present the Association has 25 organized chapters with a membership of 2,000 and plans for organization are going forward in 15 other colleges.

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### *Josiah Macy, Jr. Foundation*

In a six year review the Josiah Macy, Jr. Foundation reports that from its incorporation until December 31, 1936, the Foundation has made three hundred and twenty-four grants totaling \$806,681.75. These grants have been made to thirty-four different universities and twenty-seven other agencies of research in the United States, in Belgium, Czechoslovakia, France, Germany, Hungary, Netherlands, and U.S.S.R.

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### *The Commonwealth Fund*

The Commonwealth Fund reported that its endowment had been increased by \$8,000,000 as the result of two gifts from its president, Edward S. Harkness, and that it made grants of approximately \$1,800,000 from current income in the year ending September 30, 1937.

The capital newly provided by Mr. Harkness is dedicated to general philanthropic purposes without permanent restrictions, but for the present the income from \$3,000,000 is to be used for the development of rural hospitals, and that from \$5,000,000 for medical education and medical research. It is planned to build one new hospital annually and to expand the Fund's gift to medical schools for teaching and scientific investigation. The recent additions bring the total endowment of the Fund to just over \$50,000,000.

As in other recent years the income of the Fund has been spent chiefly for



the betterment of health, particularly through the provision of rural community hospitals, the encouragement of rural public health service, the improvement of medical teaching, medical research, and professional education generally. Taking physical and mental health together, 74 per cent of the Fund's total appropriations in 1937 went for these purposes.

Believing that "public health does not rise far above the level of medical practice, nor medical practice above that of medical teaching," the Fund has also aided medical schools in more general ways. At Vanderbilt, Tulane, and Tufts it has provided funds to strengthen the teaching of preventive medicine. At Tulane it has aided in the expansion of the department of pediatrics. At Cornell, Columbia, and Harvard it has helped to finance teaching clinics in which emotional and behavior problems are given due weight in the care of children's diseases. At the University of Louisville it has helped to build up facilities for teaching psychiatry as an element in general medicine. The Fund has given fellowships for graduate study in psychiatry at Johns Hopkins and the University of Colorado, and for special postgraduate training of psychiatrists at five child guidance clinics.

Without confining itself to any single field of inquiry, the Fund has aided research in a number of medical schools and hospitals. In allocating the new income available for this purpose the Fund announces that "it will continue to be in one sense frankly opportunistic," seeking only projects that give promise of contributing sooner or later to better medical practice.

Some of these grants are closely related to other activities of the Fund. For example, in addition to the study of disorders of pregnancy and childbirth at New York University, the Fund has sponsored statistical and clinical studies of maternal mortality in New York and in two southern counties, has helped to finance extension courses in obstetrics

for the physicians of three states, has built up maternity nursing care in rural health departments, and has provided convenient and comfortable facilities for the safeguarding of childbirth in its rural hospitals.

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#### *Alpha Epsilon Delta*

Alpha Epsilon Delta, national honorary premedical fraternity, will hold its national biennial convention at the University of North Carolina, Chapel Hill, on March 25-26, 1938. The North Carolina Beta Chapter at the University will act as host for the convention and under the supervision of the faculty adviser, Dr. R. W. Bost, professor of chemistry, will have charge of the arrangements for the convention.

The nineteenth chapter of the fraternity was installed as the Arkansas Alpha Chapter at the University of Arkansas, Fayetteville, on January 8th. Dr. Emmett B. Carmichael, School of Medicine, University of Alabama, and grand president of the fraternity, conducted the installation.

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#### *American Board of Ophthalmology*

The American Board of Ophthalmology will hold examinations in San Francisco, June 13th, Washington, D. C., Oct. 8th, and Oklahoma City, Nov. 14th.

Up to the end of 1937, the Board has held fifty-six examinations and had certified 1,498 ophthalmologists. The Board on January 1st, 1938, issued a new and complete list of physicians certificated to date, arranged geographically.

The American Board of Ophthalmology has established a Preparatory Group of prospective candidates for its certificate. The purpose of this group is to furnish such information and advice to physicians who are studying or about to study ophthalmology may render them acceptable for examination and certifi-



cation after they have fulfilled the necessary requirements. Any graduate or undergraduate of an approved medical school may make application for membership in this group. Upon acceptance of the application, information will be sent concerning the ethical and educational requirements, and advice to members of the group will be available through preceptors who are members or associates of the Board. Members of the group will be required to submit annually a summarized record of their activities.

The fee for membership in the Preparatory Group is ten dollars, but this amount will be deducted from the fifty dollars ultimately required of every candidate for examination and certification. For sufficient reason, a member of the Preparatory Group may be dropped by vote of the Board.

In future issues of the directory of the American Medical Association certificated ophthalmologists will be so designated in their listing. The secretary of the Board is Dr. John Green, 3720 Washington Boulevard, St. Louis, Mo.

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#### *California Society for the Promotion of Medical Research*

The following resolution was adopted at the request of the California Society for the Promotion of Medical Research:

"The Western Society of Naturalists, meeting in Berkeley, California, December 28, 29 and 30, 1937, records its emphatic opposition to any measure such as the proposed 'State Humane Pound Law' which will hinder or curtail animal experimentation as conducted by those fully qualified in biology and medicine. It is the belief of this society that the present level of health and humane

protection of man and animals and further advance in our knowledge of the phenomena of life can be maintained only by constant vigilance and by continued study of the nature of vital processes through the experimental investigation of living animals. Every effort should be made to provide the necessary animals for scientific studies rather than to interfere by the passage of hampering legislation."

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#### *Reynolds Foundation Campaign Against Syphilis*

Income from the \$7,000,000 Zachary Smith Reynolds Foundation will be used exclusively to finance a campaign against syphilis in North Carolina, it was recently announced by trustees of the foundation established in 1936 in memory of the late Zachary Smith Reynolds of the Reynolds tobacco family. The income will amount to more than \$100,000 a year, it was said, and this amount has already been presented to the state board of health for the first year's work. As a result of an appropriation of \$25,000 by the last general assembly, the state now has sixty-seven clinics for venereal disease in operation. The new fund will be used to expand about twelve of these in the more populous counties. A clinic on wheels, consisting of a motor truck fitted as a physician's office and accompanied by a doctor and a trained nurse, will be operated in rural districts as one of the first projects, and others will be added if one proves successful. Drugs for treatment will be supplied by the board of health in all clinics and also to physicians who cooperate in the program. Dr. Carl V. Reynolds, Raleigh, state health officer, is in charge of planning the campaign.

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## Abstracts of Current Literature

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### *Danger of Scrappiness*

Our fathers and grandfathers were brought up to appreciate the value of thoroughness. We admire it in them and in their writings. The Victorians knew their reading, writing and arithmetic. But it was much easier for them than for us. The conditions of modern life make for diffuseness and scrappiness. There is a modern craze for news. Not only are there newspapers, or rather sheets of advertisements amongst which snippets of information are scattered here and there, but there are weekly newsmagazines containing so much information that by the time you have finished one issue the next is arriving, and picture magazines with news, hot or otherwise, whilst the radio in the intervals of crooning gives us news from all parts of the world.

Now news is one of the most interesting of things. The newspaper man calls it a story, and he is right. But it has its dangers. You may remember that when Paul came to Athens he found that the people were always seeking after some new thing. Yes, but that was after the Golden Age had passed away. News is delightful for the old, for the business man who has nothing to do with his evenings, for the feeble minded. But for the student it is a seducer whose danger is its apparent innocence. It fills the mind with scraps of information, but the student's aim and ideal should be thoroughness, not scrappiness. It is thoroughness which makes a man a great golfer or figure skater, a great internist or anatomist. But thoroughness and distraction do not go together. I have seen a man studying (?) in a room in which the radio was playing! Such men always feel aggrieved when the list of supplementals comes out.

Another cause of modern scrappiness of mind is the "digest habit." On every bookstall you will see a digest of this

and a digest of that, handy little magazines which can be slipped into a pocket or carried on a street car. In these places they are splendid, and they will enable you to produce scraps of literary information at a dinner party like a conjurer produces rabbits from a hat. But they have no place in a student's study. His time and the integrity of his mind are too precious. For they do not take the place of the books they abstract. Recently I read a "digest" of "An American Doctor's Odyssey," and afterwards I read the book itself. The impression created on my mind was absolutely different in the two cases. Imagine reading a digest of King Lear or the Forsyte Saga or The Seven Pillars of Wisdom. Besides, if you are always taking things predigested, what is going to happen to your own digestive organs?

May I suggest to the students of our medical school that great pleasure and satisfaction is to be derived from knowing one thing really well, from being master of one subject however small. Thoroughness rather than scrappiness. And with that thoroughness will come competence and mastery, and such mastery will bring the recognition from his fellows which every man enjoys. As Emerson says: "Let a man preach a better sermon, write a better book, or build a better mouse trap than his neighbor—though he build his house in the woods, the world will make a path to his door."

A thorough knowledge of a subject is possible in two branches of thought, the one professional, the other general. The medical student may set himself to become an expert on the anatomy, histology, and physiology of an organ, or on the pathology and clinical features of a disease. The former is more likely to appeal to him in his earlier years, the latter in the clinical part of his course. Should a man interest himself in such an organ as the kidney, prostate or parathyroid.

he will be surprised how frequently new information regarding his pet subject meets his eye. The "news" may be scrappy, but it will be integrated in the mind so as to form part of a composite whole. The same is true of a disease such as coronary occlusion, cholecystitis, or bronchogenic carcinoma.

In the field of general reading a student may also become an expert. It is remarkable how in a very few years one can read all the works of an author that are worth reading, and when the author is a master of matter or style, these insensibly color the mind of the reader. But such reading can only be done if one is aware of the danger of scrappiness. "Paradise Lost" and "The Ring and the Book" may appear alarming because of their length, but in my third year in medicine at Edinburgh I read the twelve books of Milton's immortal work on Sunday afternoons before Christmas and the twelve books of Browning after Christmas.

Each man has to decide for himself what he wants, but there is not time in the study of medicine to color the mind with Robert Louis Stevenson or Conrad as well as the latest gossip from Hollywood. "Do you know" says Ruskin, "if you read this, that you can not read that—that what you lose today you cannot gain tomorrow? Will you go and gossip with your housemaid or your stableboy, when you may talk with queens and kings, or flatter yourself that it is with any worthy consciousness of your

own claims to respect that you jostle with the hungry and common crowd for entrée here and audience there, when all the while this eternal court is open to you, with its society wide as the world, multitudinous as its days, the chosen and the mighty of every place and time?"

Great books are the greatest relaxation that the world can offer to the hard worked medical man, be he student or practitioner. In his brief moments of leisure he can turn to the great silent company who stand on his bookshelves waiting to be heard. "For a man's true life for which he consents to live may lie altogether in the field of fancy. The clergyman, in his spare hours, may be winning battles, the farmer sailing ships, the banker reaping triumph in the arts; all leading another life, plying another trade from that they chose. For to look at the man is but to court deception. We shall see the trunk from which he draws his nourishment; but he himself is above and abroad in the green dome of foliage, hummed through by winds and nested in by nightingales. For no man lives in the external truth, among salts and acids, but in the warm phantasmagoric chamber of his brain, with the painted windows and the storied walls."

If you know your Robert Louis Stevenson you will know where that comes from, as well as dozens of other passages which will become part and parcel of your mind. But such knowledge will never come if you abandon yourself to scrappiness.—BOYD, WM., *Univ. Toronto M. J.*, 15:104-105 (Dec.), 1937.

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## Book News

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*The Diary of a Surgeon*

By John Knyveton, Licentiate of the Society of Apothecaries; Doctor of Medicine of the University of Aberdeen; Teacher of Midwifery to and Midwife in Infirmary Hall; Surgeon's Mate, H.M.S. Lancaster. Edited and transcribed by Ernest Gray. D. Appleton-Century Company, New York. 1937.

The editor says as to authenticity of this diary that he who had it in his possession "was a distant successor of a very close friend of the editor, the leather bound Journal in which the Diary is written appearing whilst helping this friend sort out some old family records, and being presented to him, as one specially interested in the History of Medicine." The diarist was born in 1724 and died in 1809. The diary covers only the first year of his life as a surgeon. It is most interesting, being almost a day by day recital of the diarist's life as a medical student and surgeon at a time when antiseptics and anesthesia had not even been thought of by the best men in the profession. Going directly from an uncompleted autopsy to a delivery was quite the vogue. Severe infections and compound fractures called for amputation of the affected limb. "Humours" gone awry were regarded as the cause of all afflictions. William Hunter had just appeared on the scene. Smellie's obstetric forcep was already in use. The interior of the body was a forbidden kingdom. Hospitals were terrible. "Grave robbing" and "anatomising" were the outstanding activities of the day. Personal hygiene was wholly unknown. Bleeding, clysters, blisters and the use of medicaments wholly forgotten were the vogue. Washing the intestine with sea water before returning it to the abdomen was considered proper treatment. And so on ad finitum. It is good reading for idle

moments and in comparison with modern methods and views is most instructive.

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*Physical Diagnosis*

By Don C. Sutton, M.D., Associate Professor of Medicine, Northwestern University Medical School. C. V. Mosby Company, St. Louis. 1937. Price, \$5.

Based on the author's long experience in the "art and technic of history taking and physical examination of the patient in health and disease." The use of the senses is stressed. The importance of physical diagnosis calls for a teaching text as complete and thorough as is this one. It should have a place in the library of every medical student.

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*Synopsis of Digestive Diseases.*

By John L. Kantor, M.D., Associate in Medicine, Columbia University. C. V. Mosby Company, St. Louis. 1937. Price, \$3.50.

Concise; complete; well written; based largely on the author's personal experience, hence free from needless discussions; many diet lists from the Montefiore Hospital Manual of Diets.

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*Introduction to Dermatology*

By Dr. Richard L. Sutton and his son, Richard L., Jr. 3d. Ed. C. V. Mosby Company, St. Louis. 1937. Price, \$5.

The vast accumulation of new material in this field has necessitated re-writing, rearranging and adding much new material, which the authors have done in their usual good manner. Students will find this a valuable aid in studying diseases of the skin. The section on syphilis deserves special commendation.

*Diseases of the Skin*

By the late Robert W. MacKenna, M.D., Lecturer in Dermatology, University of Liverpool. 4th Ed. Revised by Dr. Robert M. B. MacKenna. William Wood & Company, Baltimore. 1937. Price, \$7.

A concise but sufficiently complete book for the medical student; beautifully illustrated; good coverage of treatment with useful prescriptions.

♦ ♦

*Approved Laboratory Technic*

By John A. Kolmer, M. D., Professor of Medicine, Temple University, and Fred Boerner, V.M.D., Assistant Professor of Bacteriology, University of Pennsylvania School of Medicine. 2d. Ed. D. Appleton-Century Company, New York. 1938. Price, \$8.

Primarily a book for laboratory technicians. The long list of collaborators gives assurance of excellence and high value of the material presented. Five new chapters have been added to bring the work up-to-date.

♦ ♦

*The Physician's Business*

By George D. Wolf, M.D., New York, with a foreword by Dr. Harold Rypins. J. B. Lippincott Company, Philadelphia. 1938.

Very helpful for the young physician who is trying to solve the economics of the practice of medicine and about which he is told little, if anything, during his stay in the medical school.

♦ ♦

*Fractures and Dislocations for Practitioners*

By Edwin O. Geckeler, M.D., Lecturer on Fractures and Dislocations, Hahnemann Medical College, Philadelphia. William Wood & Company, Baltimore. 1937. Price, \$4.

A condensed guide, giving only the most practical method of treatment for a given injury; specially designed for care of industrial and automobile accident cases. Well illustrated. End of chapter references could have been omit-

ted in a book such as this is—for daily use in emergencies.

♦ ♦

*Essentials of Prescription Writing*

By Cary Eggleston, M.D., Assistant Professor of Clinical Medicine, Cornell University Medical College, New York City. 6th Ed. W. B. Saunders Company, Philadelphia. 1938. Price, \$1.50.

A boon for the student and the young practitioner who finds that he knows too little about prescription writing.

♦ ♦

*Practice of Orthopedic Surgery*

By T. P. McMurray, Lecturer in Orthopedic Surgery, Liverpool University. William Wood & Company, Baltimore. 1937. Price, \$5.

A description of basic principles underlying treatment in orthopedic surgery, with omission of details and of treatment of fractures. Good for students. Well illustrated. Convenient size, but why not have used a lighter weight paper to make the book less ponderous as to weight?

♦ ♦

*A Primer for Diabetic Patients*

By Russell M. Wilder, M.D., Professor and Chief of the Department of Medicine, Mayo Foundation, University of Minnesota. 6th Ed. W. B. Saunders Company, Philadelphia. 1937. Price, \$1.75.

An outline of treatment for diabetes with diet, insulin and protamine zinc insulin, including directions and charts for the use of physicians in planning diet prescriptions. The Primer contains the substance of the instruction given in the Diabetic School at the Mayo Clinic. The primer can be used by the patient who is under the care of a physician. A very good book.

♦ ♦

*Medical State Board Examinations: Topical Summaries and Answers*

By Harold Rypins, M.D., Secretary, New York State Board of Medical Examiners; Member, National Board of Medical Examiners. 3d Ed. J. B. Lip-



pincott Company, Philadelphia. 1937. Price, \$4.50.

In 10 chapters; arranged according to the major divisions of the medical curriculum; concise review for each chapter with questions by means of which the reader may test his knowledge. Not the usual question and answer type of help used by candidates for licensure. The author's many years of experience in this field give assurance of his having given something worth while even for those who do not wish to take a licensing examination but would like to "brush up" a bit on fundamentals.

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#### *Tumors of the Nervous System.*

By Members of the Association for Research in Nervous and Mental Disease. Editors: Drs. Edwin G. Zabriske; Angus M. Frantz and Clarence C. Hare. Williams & Wilkins Company, Baltimore. 1937. Price, \$7.50.

This is volume xvi in the series of works published by this Association. Presented are the investigations of a number of first class men into the recent advances in this special field, plus the discussions of their papers. All who are interested in pathology, especially neuropathology, neurology or psychiatry, will find this to be a valuable book. Every type of tumor of the nervous system is described thoroughly.

♦ ♦

#### *Clinical Allergy.*

By Louis Tuft, M.D., Chief of Clinic of Allergy and Applied Immunology, Temple University; with an introduction by Dr. John A. Kolmer, Professor of Medicine, Temple University. W. B. Saunders Company, Philadelphia. 1937. Price, \$8.

The important facts and methods in the field of allergy are presented in concise form without exhaustive reviews or discussions of conflicting opinions. Sta-

tistical data have been omitted except when essential to the completeness of the text. The terminology employed is simple and easily understood. The book is divided into four sections: (1) fundamental principles of allergy and anaphylaxis with principles of diagnosis and treatment; (2) basic etiologic types responsible for most allergic conditions; (3) discussion of characteristic clinical manifestations of allergy, not including the skin; (4) relationship of allergy to allergic dermatoses and to the specialties. In the appendix are included various laboratory methods of importance in anaphylaxis and allergy and other data, such as diet lists, etc. The bibliography is excellent.

♦ ♦

#### *The Normal Encephalogram*

By Leo M. Davidoff, M.D., Assistant Professor of Neurology in the College of Physicians and Surgeons, Columbia University, and Cornelius G. Dyke, M.D., Assistant Professor of Radiology in the College of Physicians and Surgeons, Columbia University. Lea & Febiger, Philadelphia. 1937. Price, \$5.50.

This book will meet the needs of neurological surgeons, neurologists, roentgenologists, pediatricians, internists and general practitioners. It presents the fundamentals of encephalography based on the authors' experience with four thousand cases and supplemented by a complete review of the literature on the subject. It offers a description of the technique, the indications and contraindications for the performance of the test and the reaction of the patient during and after the procedure. The book constitutes an encephalographic anatomy, presenting the anatomy of the living brain and its coverings viewed by means of the contrasting shadows of tissues and gas. It provides an important fundamental aid to diagnosis and correct interpretation.



